142
T MUSEUM
JAN 1970
606
MADRAS

Records of the Botanical Survey of India

Volume VI.—No. 3

(1) REPORT ON THE MOSSES OF THE ABOR EXPEDITION, 1911-12

BY

H. N. Dixon, M.A., F.L.S.

(2) REPORT ON THE MOSSES COLLECTED BY MR. C. E. C. FISCHER AND OTHERS FROM SOUTH INDIA AND CEYLON

BY

H. N. Dixon, M.A., F.L.S.

CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1914

Issued in 1914

Price As. 12 or 1s. 3*d*.

RECORDS

OF THE

BOTANICAL SURVEY OF INDIA

VOLUME VI.—No. 3

(1) REPORT ON THE MOSSES OF THE ABOR EXPEDITION 1911-12

BY

H. N. DIXON, M.A., F.L.S.

(2) REPORT ON THE MOSSES COLLECTED

BY

MR. C. E. C. FISCHER

AND OTHERS FROM SOUTH INDIA AND CEYLON

BY

H. N. DIXON, M.A., F.L.S.

CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1914

Agents for the sale of Books published by the Superintendent of Government Printing, India, Calcutta.

In the United Kingdom.

Bernard Quaritch, 11, Grafton Street, New Bond Street, London, W.

Constable & Co., 10, Orange Street, Leicester Square, London, W.C.

H. S. King & Co., 65, Cornhill, and 9, Pall Mall, London.

P. S. King & Son, 2 & 4, Great Smith St., Westminster, London, S.W.

Kegan Paul, Trench, Trubner & Co., 68—74, Carter Lane, E.C.

Grindlay & Co., 54, Parliament Street, London, S.W.

T. Fisher Unwin, 1, Adelphi Terrace, London, W.C.

W. Thacker & Co., 2, Creed Lane, London, E.C.

Luzac & Co., 46, Great Russell Street, London, W.C.

Deighton, Bell & Co., Cambridge.

B. H. Blackwell, 50 and 51, Broad Street, Oxford.

Oliver & Boyd, Tweeddale Court, Edinburgh.

E. Ponsonby, Ld., 116, Grafton Street, Dublin.

On the Continent.

R. Friedlander & Sohn, Berlin W.N., Carlstrasse, 11.

Otto Harrassowitz, Leipzig, Germany.

Karl W. Hiersemann, Leipzig, Germany.

Martinus Nijhoff, The Hague, Holland.

Ernest Leroux, 28, Rue Bonaparte, Paris, France.

In India and Ceylon.

Thacker, Spink & Co., Calcutta and Simla.

Newman & Co., Calcutta.

R. Cambray & Co., Calcutta.

S. K. Lahiri & Co., Calcutta.

B. Banerjee & Co., Calcutta.

Rai M. C. Sircar Bahadur & Sons, 75—1—1, Harrison Road, Calcutta.

The Calcutta School Book and Useful Literature Society, 309, Bow Bazar Street, Calcutta.

Butterworth & Co. (India), Ld., Calcutta.

The Weldon Library, 18-5, Chowringhee, Calcutta.

V. Kalyanarama Iyer & Co., Madras

G. A. Natesan & Co., Madras.

Higginbotham & Co., Madras.

S. Murthy & Co., Madras.

Thompson & Co., Madras.

Temple & Co., Madras.

Combridge & Co., Madras.

P. R. Rama Iyer & Co., Madras.

Thacker & Co., Ld., Bombay.

A. J. Combridge & Co., Bombay.

D. B. Taraporevala, Sons & Co., Bombay.

Gopal Narayan & Co., Bombay.

Radhabai Atmaram Sagoon, Bombay.

Sundar Pandurang, Bombay.

Ram Chandra Govind & Son, Kalbadevi, Bombay.

N. B. Mathur, Superintendent, Nazir Kanun Hind Press, Allahabad.

Superintendent, American Baptist Mission Press, Rangoon.

A. Chand & Co., Lahore.

Rai Sahib M. Gulab Singh and Sons, Mufid-i-Am Press, Lahore, and Calcutta.

Babu S. C. Talukdar, Proprietor, Students and Co., Cooch Behar.

A. M. and J. Ferguson, Colombo, Ceylon.

REPORT ON THE MOSSES OF THE ABOR EXPEDITION, 1911-12

By

H. N. DIXON, M.A., F.L.S.

[**Editorial Note** :—The Abor Hills constitute "a section of the Himalayan range lying on the northern frontier of Assam, between the Siom river on the west and the Dibang on the east, occupied by tribes of Tibeto-Burman origin." (Imperial Gazetteer of India 1908, V, 9.)

A punitive expedition was despatched against the Abors towards the end of 1911. Several officers of the Scientific departments of the Government of India were permitted to accompany the expedition and amongst them was Mr. I. H. Burkill, M.A., F.L.S., lately Economic Botanist to the Botanical Survey of India, and now Director of the Botanical Gardens in the Straits Settlements. The mosses collected by Mr. Burkill were sent to Mr. H. N. Dixon, M.A., F.L.S., for determination, and the following report has been kindly contributed by the latter.]

The mosses collected by Mr. Burkill were not numerous, amounting to a little over 60 numbers; but for the size of the collection they presented a considerable degree of interest, including some half-a-dozen undescribed species besides a few which indicated an interesting extension of geographical range. The most notable perhaps of these is *Claopodium crispulum* Broth. (*Pseudoleskea crispula* Bry. jav.), which has hitherto been recorded only from Java and Formosa. Cardot in the Mousses de l'île Formose (Beihefte zum Bot. Centralbl., Bd. XIX, Abt. II, 1905), in giving some account of the general distribution of the mosses of that island, has drawn up a list of 15 species which are common to Formosa, the Himalayan range, and the Malayan Archipelago, with six others found in the two former regions but not known at present from Malaysia. This relationship supports, so far as it goes, the evidence afforded by Phanerogams and Vascular Cryptogams as to the geographical affinities of the flora of the Assam region. Drude (Handb. der Pflanzengeographie, p. 479), divides the Indo-Malayan tract into ten floral regions; the 5th and 6th being—

5. Birma (Pegu, Cachar, etc., nordwärts sich mit der Tropenregion des sudöstl. Himalaya mischend).

6. Siam—Annam mit Formosa und dem nordöstlichen Ausläufern des indischen Reiches.

These two regions merge together in Assam, from the south and east, while from the west the flora of the great Himalayan range intrudes; and these three floral zones are represented among the bryophytes equally with the higher plants; indeed even the comparatively small

collection dealt with here includes representatives of all three. Thus, Drude's regions 5 and 6 respectively, and the Himalayan region, are represented by the species, among others, in the following three groups :—

(1) *Vesicularia Montagnei*, *Mnium succulentum*.

(2) *Barbella enervis*, *Leucobryum javense*, *Floribundaria floribunda*, *Campylium glaucocarpum*, *Physcomitrium repandum*.

(3) *Neckeropsis acutata*, *Vesicularia succosa*, *Hypopterygium flavo-limbatum*, *Trematodon conformis*.

All the species in (1) and (2) were collected, as would be expected, in the plains around Kobo or at quite low altitudes in the hills. As soon as we ascend to the higher levels, the Lower Hill and Upper Hill Forests described by Mr. Burkill (The Botany of the Abor Expedition—Report of the British Association, Section K, Dundee, 1912), these floral relations cease and the affinity of the mosses with those of the Himalayan range becomes at once evident as in (3).

It is obvious that the geographical and climatal conditions that permit a given area to be the meeting place of several phyto-geographical regions, may also, provided the conditions persist over a sufficient period, permit also of that area being a centre of distribution back into the several regions concerned ; indeed identical facts of distribution might in certain cases be explicable on either ground. This should perhaps be taken into account in considering the plant distribution in this district. I have not attempted to ascertain what body of evidence there is for looking upon the Assam or Khasian region as a centre of dispersal, either from the bryophytes or other groups of plants, but the distribution of one genus of mosses, at least, is certainly highly suggestive in this direction. I refer to the genus *Symphyodon*. This is a clearly characterized and striking genus, of which at present, so far as I am aware, eighteen species are known. Of these the Philippines, New Caledonia and S. China furnish one endemic species each, the remaining 15 being entirely confined to the Indian and Malayan peninsulas, except that one species, *S. Perrottetii* with a wide distribution in India extends also to Java and the Moluccas. Fourteen species, therefore, out of eighteen find their limits within the East Indian peninsular region, and of these eleven are confined to the area centring round Khasia, from Nepal and Bhotan on the west (including four undescribed species of Brotherus in Sikkim), and an unpublished species of Mitten's from Burma on the south-east; five or six of them, including the two species described in this paper, occurring in, and four being confined to this part of Assam. It seems impossible in such a case to look upon the Khasian district in any

other way than as the centre of dispersal of this genus, and without attempting to base any generalizations upon a single case, I suggest that it may be worth investigation how far it is supported by further evidence from this and other groups of plants.

I desire to express my obligation to M. Cardot for assistance in the preparation of both this and the following report.

I may also mention that the types of the new species here described are in my herbarium, which I hope will ultimately find a home in the British Museum collection; co-type specimens of each, moreover, are in the Herbarium of the Royal Botanic Garden, Calcutta.

1. **Trematodon** Rich.

1. **Trematodon conformis** Mitt. Musc. Ind. or. p. 12.

On a stone, Pasighat (n. 36587). Kobo, February, 1912 (n. 38107).

Mr. Burkill remarks on this that "it was very common about the clearing of the camp, growing on the bare earth. It was not present in December, or at least not noticed." As the capsules are in many cases ripe and deoperculate, it is scarcely possible that the entire development could have taken place, from the spore, between the two visits. It is probable that the gametophyte was present, but being small would be inconspicuous, or indeed partly hidden; the clearing would give an opportunity for the better development of the plants, no doubt, than would normally be the case. Both specimens were in good fruit, the capsules exhibiting, as is usual in this genus, a great diversity of maturity in the same gathering.

2. **Dicranoloma** Ren.

2. **Dicranoloma subreflexifolium** Par.

Syn. *Dicranum reflexifolium* Mitt. Musc. Ind. or. p. 15 (haud C. Müll.)

Dicranum subreflexifolium C. M. in Bot. Zeit., 1864, p. 349. Summit between Serpo and Lalik, alt. 5,100 ft., xerophytic moss from rocks (n. 36344) c. fr.

I have compared this with the Khasian specimens in Hooker's herbarium, referred (erroneously) by Mitten to the Malaysian *D. reflexifolium* C. M., but distinguished by C. Müller and forming the type of his *D. subreflexifolium*. It agrees in nearly every detail, the toothing of the leaves varies in Hooker and Thomson's plant, being often weaker

than, but at times equal to, that of the Abor specimen; and the leaves are a shade closer, and not markedly fragile, as they are to some extent in the latter; the seta also is a shade shorter; but the differences are minute in comparison with the general agreement, and I do not think it is possible to separate them.

3. Leucobryum Hpe.

3. **Leucobryum javense** (Brid.) Mitt. Musc. Ind. or. p. 25. Rocks at top of summit between Serpo and Lalik, alt. 5,100 ft., c. fr. n. 36345).

Fleischer (Musci...von Buitenzorg I, 149) cites Hampe's description of the fruit of this species, which is in some respects rather misleading, notably in the terms "Kapsel klein trocken wenig gestreift." I have examined the fruiting specimens in Hampe's herbarium (Borneo, leg. Beccari), which shows the capsules exactly as in the Abor plant, by no means small for the genus, and quite markedly striate when dry.

4. Octoblepharum Hedw.

4. **Octoblepharum albidum** (Linn.) Hedw.

South side of a tree trunk in dense shade, Kobo, c. fr. (n. 37027).

5. Fissidens Hedw.

5. **Fissidens diversifolius** Mitt. Musc. Ind. or. p. 140.

Fruiting abundantly on pieces of wood embedded in the river bed; it had been submerged all the rains. Kobo, c. fr. (n. 37086). On lower rocks on the river bank, Janakmukh, c. fr. (n. 37160).

From the description of the locality for the type plant, and from specimens which I have received from southern India, it is evident that the normal habitat for this species is within the reach of, and frequently overflowed by, water. It varies very greatly, not only in the form of leaf but also in the degree of limbation, for though usually quite immarginate the vaginant lamina may sometimes show a quite distinct though narrow border.

Mr. Burkill informs me that the Abor plant bears ripe fruit early in December only a month, or even less, from the date when it becomes exposed—a very interesting instance of adaptation to the special circumstances of its development.

6. **Fissidens pulchellus** Mitt. Musc. Ind. or. p. 140.

Trees, summit of Bapu, alt. 6,240 ft. c. fr. (n. 36563).

I only know this plant from descriptions, but I think there can be little doubt of the correctness of the determination. The single specimen of this name in the Brit. Mus. in herb. Hampe does not look to me at all likely to be correctly determined.

7. **Fissidens nobilis** Griff.

Near Upper Rengging camp at 2,600 ft.; on a rock in considerable shade, on north exposure, growing downwards and outwards; ♀ (n. 36258).

6. Barbula Hedw.

8. **Barbula comosa** Dz. and Mb.

On small stones on the undercliff below Janakmukh where water trickles down c, fr. (n. 37214).

7. Macromitrium Brid.

9. **Macromitrium nepalense** (Hook. and Grev.) Schwaegr.

On upper side of branches of *Flacourtia cataphracta* Roxb., Janakmukh, c. fr. (n. 37185).

On trunks of *Terminalia myriocarpa,* Janakmukh, c. fr. (n. 37255). On rocks, Yambung stream, alt. 900 ft. c. fr. (n. 37723).

A slender, lax, elongate form with more pellucid, thinner-walled cells (n. 36485 without locality) seems to be a shade form of the same plant. *M. nepalense* is a wide-spread and apparently a variable species, and judging from Wilson's specimen of *M. assamicum* in the British Museum collection (W. 28 without locality), I should think that Mitten is quite correct in tentatively referring that species to *M. nepalense.*

8. Physcomitrium Brid.

10. **Physcomitrium pulchellum** Mitt. Musc. Ind. or. p. 54.

Syn. *Gymnostomum pulchellum* Griff.

On bare soil, near Rotung, c. fr. (n. 37625).

11. **Physcomitrium repandum** Mitt. op. et. loc. cit.

Syn. *Gymnostomum repandum* Griff.

On vertical face of earth, alt. 900 ft., junction of Yambung and Dehong, c. fr. (n. 37722).

9. Rhizogonium Brid.

12. Rhizogonium spiniforme (Linn.) Bruch.

Spur above upper Rengging camp, on fallen rotten branch, alt. 4,200 ft., c. fr. (n. 36285). Tree trunk, Lalik Valley, alt. 2,700 ft., c. fr. (n. 37335*a*.)

10. Mnium Dill.

13. Mnium rostratum Schrad.

Evidently a common moss here as throughout the Himalaya range (nos. 36115, 36174, 36541).

14. Mnium succulentum Mitt. Musc. Ind. or. p. 143.

Janakmukh; with Hepatic on rocks, st. (n. 37177). (Plates I, II, fig. 5.)

Fleischer (Musci......von Buitenzorg, II, 581) describes *M. succulentum*, referring to it *M. integrum* Bry. jav.; and has issued Javanese specimens as *M. succulentum* and *M. succulentum*. n. var. *densum* Fleisch. in the M. Frond. Arch. Ind., nos. 367 and 467. He has however unfortunately been misled, no doubt by an examination of the specimens purporting to be Mitten's types. The type specimen should be No. 680, Hb. Ind. or. of Hooker, Nepal orient. reg. temp. Unhappily both at Kew and at the British Museum the specimen under this number contains only *M. rostratum*, with which no doubt the true plant was associated. Mitten however describes his plant as "*M. rostrato* habitu omnino simile, sed foliis paululum majoribus, cellulis sexies majoribus succulentis," and Assam specimens, leg. Griffith, at Kew, determined by Mitten, agree precisely in these respects with his description, having a quite different texture, a narrow, not cartilaginous border to the leaves, and the cells between two and three times the diameter of those of *M. rostratum* (Mitten's "sexies" would apply quite well to the superficial measurement).

It will be seen from a comparison of Fleischer's description that it applies to a moss in no way markedly distinct from *M. rostratum* except in the dioicous inflorescence (the cell measurements would apply very well to that, but by no means to the true *M. succulentum*). I have not seen No. 367 M. Fr. Arch. Ind.; but No. 467—which has the leaves by no means entire—I should refer unhesitatingly to *M. rostratum*, judging from the vegetative characters; I have not been able to examine the inflorescence.

The margin in *M. succulentum* varies greatly even as between the leaves of a single stem. Mitten describes the cells as "marginalibus con-

formis intensius coloratis," which however scarcely applies to the prevailing type so far as I have studied his specimens. In most cases I find a narrow border of a single or at times double row of elongate cells, which are by no means cartilaginous or incrassate, often scarcely narrower than the interior cells, sometimes chlorophyllose, at others nearly empty and pellucid. The number of rows of marginal cells varies from one to three or four, and the border may be subentire or sharply and closely toothed, with all intervening forms. In no case could it, I think, be taken for *M. rostratum*, and in certain forms where it is entire or practically so, it more nearly resembles that of *M. subglobosum*. The cells in the upper part of the leaf, about half-way between the nerve and the margin, measure about 45—60μ in the shortest diameter (as compared with 18—25μ in *M. rostratum*), and are not at all incrassate or collenchymatous.

As it seems desirable to establish the species more firmly, and it has not yet been figured, I have given figures of the Abor plant (Plate I, fig. 5*a*) showing the cells as compared with those of *M. rostratum* (fig. 4*a*), and also of the Assam plant at Kew, referred to above, showing the marginal cells on different leaves.

11. Philonotis Brid.

15. Philonotis speciosa (Griff.) Mitt.

Janakmukh, c. fr. (n. 36474, 37171); on loose stones and mud on the undercliff below Janakmukh, c. fr. (n. 37213).

12. Pogonatum P. Beauv.

16. Pogonatum sp. On dry stony surface of undercliff below Janakmukh (n. 37215).

Possibly *P. leucopogon* Ren. and Card. but in the absence of mature fruit doubtful. The capsule is only slightly papillose, the seta slightly longer, and the leaf base only slightly and not abruptly widened. The marginal cell of lamella in section is not enlarged and scarcely flattened.

13. Floribundaria C. Müll.

17. Floribundaria floribunda (Dz. & Mb.) Fleisch.

On the upper side of a hanging tree trunk in deep shade, Kobo, st. (n. 37070). A rather robust, bright green form, but consisting entirely of quite young stems. The cells are nearly all unipapillate; the margin here and there narrowly recurved.

14. Barbella Fleisch.

18. Barbella enervis (Thw. & Mitt.) Fleisch. (Plate II, fig. 8).

Syn. *Meteorium enerve* Thw. & Mitt.

Meteorium trichophoroides (Hampe) Mitt.

Puak, alt. 800 ft. st. (n. 36039); det. Cardot.

M. Cardot points out that this differs from *B. enervis* only in the alar cells being slightly larger and more distinct; the habit, very marked in the distinction between the widely spreading large leaves of the secondary stems and the closely appressed filiform pointed leaves of the flagellate branches is identical in both, and the leaf characters apart from the difference referred to above, are also the same. The distribution of this plant as at present known is remarkable, being recorded hitherto only from Ceylon, the Australian Continent and Lord Howe Island. The Abor specimen, which I have figured on Plate II, is a small, probably only partially grown plant.

15. Aerobryopsis Fleisch.

19. Aerobryopsis membranacea Broth.

Syn. *Meteorium membranaceum* Mitt. Musc. Ind. or. p. 88.

Tree trunk, Rotung, 1,300 ft. alt., st. (n. 37515).

This agrees exactly with Griffith's Assam plant at Kew, on which Mitten's species was founded. I do not know that it has since been recorded.

16. Meteoriopsis Fleisch.

20. Meteoriopsis squarrosa (Hook.) Fleisch.

Trunk of *Stereospermum*, Rotung, 1,300 ft., st. (n. 36068).

17. Trachypodopsis Fleisch.

21. Trachypodopsis crispatula (Hook.) Fleisch.

Trees, summit of Bapu, alt. 6,240 ft., c. fr. (n. 36564). A green form.

18. Neckeropsis Rchdt.

22. Neckeropsis acutata Fleisch.

Syn. *Neckera acutata* Mitt. Musc. Ind. or. p. 121.

On tree trunks, above the head of the Egar, alt. 4,500 ft., st. (n. 36196).

23. Neckeropsis crinita (Griff.) Fleisch.

Syn. *Neckera crinita* Griff., Mitt. Musc. Ind. or. p. 120.

Boulders in stream-bed, between Yambung and Sissin. alt. 1,000 ft., st. (n. 36015).

19. Homalia (Brid.) Schpr.

24. Homalia exigua Bry. jav.

Boulders in stream-bed, with the previous species, st. (n. 36015b).

20. Homaliodendron Fleisch.

25. Homaliodendron flabellatum (Dicks.) Fleisch.

Tree trunks, alt. 4,500 ft. above the head of the Egar, st. (n. 36196a). Tree trunk, Lalik Valley, alt. 2,700 ft., st. (n. 37335b).

21. Symphyodon Mont.

26. Symphyodon complanatus Dixon sp. nov. (Plate I, fig. 2.)

Procerus, *læte-virens,* nitidus. Caulis fron diformis, *percomplanatus,* bis-, terpinnatus, repens, ad 10 cm. longus., ramis ramulisque brevibus, *obtusis, rigidiusculis.* Folia laxiuscule disposita, percomplanata, lateralia a caule *valde distantia, patula, immo subrecurva,* dorsalia ventraliaque erecta, appressa. Folia caulina e basi ovali oblonga subcultriformia, 2mm. longa, ad ·75mm. lata, breviter bicostata, uno margine incurvo, superne *rotundata, obtusa,* apicem versus vel e medio folio *grossiuscule irregulariter, dentibus inæqualibus, sæpe recurvatis, dentata.* Cellulœ angustissime lineares, 50-80 μ longœ, 3-5 μ latœ, prope apicem paullo breviores, *omnino læves,* ad infimam basin tantum latiores, irregulariter hexagono-rectangulares, alares perpaucœ, parvœ, rectangulares pellucidœ, parietibus subincrassatis, Folia ramea ramulinaque minora, ceterum similia. Dioicus Fl. ♂ haud visi. Flores feminei medium versus caulem insiti, bracteœ perichœtiales patulœ externœ longiuscule, internœ breviter late acuminatœ, acutœ, omnes *grosse dense dentatœ.* Seta elongata, gracilis, 3·5—4 5 cm. longa, parte inferiore *omnino lævis, prope apicem tantum scabriusculum ;* theca elliptica, 3mm. longa, in parte dimidia inferiore *parce irregulariter humiliter grosse verrucosa.* Peristomium generis, processubus 3-4 dentium longitudinem vel supra œquantibus. Spori circa 15 μ. Calyptra œque ac operculum ignota.

Hab. On a fallen branch of tree, watershed of Egar and Serpo, alt. 5,500 ft., Abor District, 23rd January 1912, leg. Burkill (n. 36208).

A fine species, which with the next is very different in habit from nearly all the species known to me, in the absolutely complanate branching, together with the form of the leaves and their dentation. *S. erraticus* (Mitt.) and *Stereodon pennatulus* Mitt. appear to be its only near allies hitherto described. The former differs in the reddish brown colour, more slender branching, the leaves less complanate, acute, with papillose upper cells, and finer marginal dentation. Brotherus places *S. erraticus* in a section with "Kapsel mit hohen Stacheln dicht besetzt;" but the

specimens in Hooker's herbarium show numerous capsules, lowly tuberculate only, as in the present plant.

Stereodon (Symphyodon) *pennatulus* Mitt. (ined.?), "Moulmein. Parish," in Herb. Kew., is similar in the complanate habit, but a very small plant, with very regularly subdistichous foliation, and leaves distinctly spathulate, finely crenulate only or erose at summit.

27. **Symphyodon scabrisetus** Dixon sp. nov. (Plate I, fig. 3.)

Speciei præcedenti habitu similis, sed multo minor, gracilius, minus exacte complanatus, ramis longioribus, ramulis *paullo attenuatis*; foliis oblongis, minus curvatis, supra *vix angustatis*, obtusis *vel subacutis, tenerius denticulatis* nervis binis *brevissimis*. Flores ♂ numerosi in axillis foliorum prœcipue superiorum. Folia perichœtialia *anguste acuminata, parum denticulata*. Seta vix 3 cm. alta, pars infima quarta tantum lœvis, supra magis magisque scabra, parte dimidia superiore *papillis prœaltis cylindricis densissime echinata*. Theca elliptica, minor, ore angustiore, *per totam fere superficiem* verucis valde inœqualibus plerumque humilibus densiuscule irregulariter obtecta. Peristomium ei prœcedentis simile, tenerius, dentibus intus altius trabeculatis. Dioicus. Cetera ignota.

Hab. On tree trunk, Lalik Valley, alt. 2,700 ft., Abor District, 22nd December 1911; leg. Burkill (n. 37335).

Closely allied to the last species, and in the vegetative characters only distinguished by slight differences which in a sterile state might have been judged to be varietal merely; they are however in all probability constant, especially the finer denticulation of the leaves in the present species, which is shown to be of no trivial importance by the absolute difference shown by the perichœtial bracts in the two species. The fruiting characters also are widely different.

The seta in this genus is usually scabrous in the upper parc, especially near the capsule, but rarely if ever approaching the degree of aspeiity of the present plant.

I find when too late for alteration that a *S. scabrisetus* exists as a MS. name in Hampe's herbarium. It is however certainly identical with *S. erraticus* (Mitt.), so that no confusion is likely to occur.

22. Distichophyllum Dz. & mb.

(28). **Distichophyllum Griffithii** Par.

Syn. *Mniadelphus Griffithii* Mitt. Musc. Ind. or. p. 145.

Epiphyllous, growing obliquely forward and downwards on leaves overhanging a stream—a tributary of the Egar—alt. 3,000 ft., c. fr. (n. 36106).

Griffith's specimens at Kew are a little more robust, but essentially agree. In one specimen (H. 3872), the cells are a little smaller, both upper and basal, while in another specimen of the same number they are appreciably larger, and almost exactly identical with those of the Abor plant.

23. Cyathophorum P. B.

29. Cyathophorum Burkillii Dixon sp. nov. (Plate I, fig. 1; II, fig. 9.)

Dioicum; habitu *C. Hookeriani* Mitt. Caulis primarius repens, tomentosus, secundarii sat conferti, ad 5 cm. alti, madefacti ad 8mm. lati, subrigidi, simplices vel sœpius *hic illic ramos laterales paucos* gerentes; plerumque in apicem caudiformem, siccitate decurvatum, filis articulatis dense sitis obrutum sensim attenuati; cœspites saturate virides, siccitate haud nitentes Folia sat conferta, valde asymmetrica, late ovata, apice breviter acutissime acuminata, illis *C. parvifoliœ* figura similia, *distincte sat late limbata, parte superiore dimidia argute minute denticulata;* costa *debilis, partem tertiam vel quartam folii tantum attingens*, sœpe brevior furcata. Areolatio regulariter rhomboideo hexagona, e cellulis apud basin laxis, apicem versus et latera pariter decrescentibus in medio folio circa 30 μ. latis, valde chlorophyllosis, parietibus tenuissimis instructa; marginalibus 2-4 seriebus, angustissimis, linearibus vel peranguste rhomboideo-linearibus, incrassatis, limbum bene notatum, latiusculum formantibus. Amphigastria exacte *orbicularia*, ad 1.5mm. lata, apice breviuscule rigide cuspidata, ecostata vel costam pertenuem dimidiam partem folii vel infra attingentem exhibentia, margine serie unica cellularum angustissime obscure limbata, *in parte superiore dimidia argute denticulata.*

Flores ♂ in plantœ propriae caulibus copiosi, sœpe in cujusque folii axillis frondis superioris siti. Planta fœminea flores pauciores, medium versus frondem plerumque insertos gerens. Seta valde arcuata vel geniculata, pallida, ·4—·5 *cm. longa* lœvis, vel cellulis mammose prominentibus subrugulosa. Theca angustissime elliptica vel elliptico-cylindrica, pallida, 2 mm. longa, collo distincto prœdita. Calyptra conico-mitriformis, *glabra,* basi subintegro. Operculum conicum, *longe rostratum.* Annulus latus, facile friabilis. Peristomium *bene evolutum* fusco-rubrum; dentes externi e basi paullo latiore lineares, fragiles, siccitate arcuato-incurvi, ·6 *mm. longi,* extus densissime minute papillosi, linea media perincrassata recta vel sinuosula exarati, intus conferte altiuscule lamellati; endostomium membrana humilis, processubus linearibus subfiliformibus *dentibus subœquilongis* nodosis papillosis, siccitate erectis, linea media recta tenui pellucida notatis, haud perforatis; cilia nulla. Spori *parvi,* 15—18μ. lati, virides, *omnino lœves.*

Hab. Growing horizontally on a tree trunk near the ground, hill south of the Rebang, alt. 2,800ft., Abor District, 8th January 1912; leg. urkill (n. 37737).

A well marked species of this interesting and very beautiful genus, having for its nearest ally *C. parvifolium* Bry. jav., but distinct from that and all the Indo-Malayan species in the amphigastria, which are perfectly orbicular, with a shorter, cuspidate point. The comparatively broadly margined leaves, and the fine and almost even denticulation over the whole of the upper half both of leaves and amphigastria are also good characters. The fruit is known in but few of these species, so far as I am aware in only *C. Adiantum* and *C. Hookerianum*, and these have the peristome much less developed, indeed comparatively rudimentary. I have figured part of a peristome on Plate II, fig. 9.

24. **Hypopterygium** Brid.

30. **Hypopterygium flavo-limbatum** C. M.

On stump, above the Serpo river, alt. 1,800 ft., c. fr. (n. 37319). Hills south of Rotung, alt. 4,400 ft., c. fr. (n. 36236a).

25. **Leskea** Hedw.

31. **Leskea perstricta** Dixon sp. nov. (Plate II, fig. 6.)

Atroviridis; caules intertexti, repentes, parce radiculosi, paraphylliis nullis, dense pinnatim vel fasciculatim ramosi; rami suberecti *perbreves*, vix 5 mm. longi, simplices vel hic illic ramulosi, *tenelli*. Rami ramulique *stricti*, nec curvati, sicci *cylindrici, teretes*. Folia *dense imbricata*, madefacta erecto patentia, sicca *arcte imbricata, adpressa*; caulina ·75 mm. longa, e basi late ovato-cordata *tenui-acuminata*, acuta; ramea minora, angustiora, breviter latiuscule acuminata, *minus acuta seu subobtusa*, omnes marginibus planis vel superne leniter anguste reflexis, integerrimis. Costa validiuscula, dorso prominens, lœvis, supra vix angustata, *prope apicem soluta vel subpercurrens*. Cellulœ superiores rhomboideo-hexagonœ, 5—8 μ latœ (circa 2 × 1), juxta costam elongatœ, marginem versus contra breviores; basilares medianœ subsimiles, paullo laxiores, marginem versus seriebus pluribus breviores, subquadratœ, numerosœ; omnes *parietibus tenuiusculis, lœves*.

Autoica. Flores ♂ numerosi, parvi, prope flores fœmineos. Perichœtia *longa* (ad 4·5 mm.), *stricta*, foliis internis omnino erectis subappressis, subvaginantibus, *pluries plicatis*, integris, longe subulato-acuminatis, tenuiter areolatis, e cellulis pellucidis anguste linearibus instructis, costa *valida, longe excurrente*.

Seta 1·5—2 cm. longa, tenuis; calyptra angusta, pallide straminea, nitida; theca (immatura) cylindrica, leniter curvata vel suberecta, operculo conico obtuso pallido. Cetera ignota.

Hab. On tree trunk, Rotung, alt. 1,000 ft., Abor District, 26th December 1911; leg. Burkill (n. 37514).

A distinct species, and in some respects of somewhat anomalous position. In the branching and foliation it more closely resembles some species of Pseudoleskea; the capsule, however, though immature, claims it undoubtedly I think for Leskea; the calyptra and lid, etc., being almost exactly those of *L. polycarpa*; the curved, and occasionally even arcuate form of the capsule is no doubt due to its unripe condition, and almost identical forms may be seen in unripe *L. polycarpa*. The straight, terete, rigid branches give it an unusual appearance, and will separate it from other species of the genus, and also from *Lindbergia*. In habit it is much like certain forms of *Leskeella nervosa*, but the inflorescence at once separates it from that. *Leskea pusilla* Mitt., from Japan, must be quite different from our plant, judging from the somewhat brief description.

26. **Claopodium** Ren. & Card.

32. **Claopodium crispulum** Broth. forma.

Syn. *Pseudoleskea crispula* Bry. jav.

On tree trunks, Kobo, c. fr. immatur. (n. 35939, 37070).

A very interesting extension of the range of this plant, hitherto only known from Java and Formosa. It differs from the figures given in the Bry. jav. in having the branch-leaves gradually shorter-pointed as they pass upwards on the branch, the uppermost ones being quite obtuse. I find however that Javanese specimens (leg. Teysmann, in Hb. Hampe, in Hb. Mus. Brit.) show the upper branch-leaves decidedly subobtuse, thus forming an intermediate link with the Abor plant, which must be considered a form only.

27. **Thuidium** Schpr.

33. **Thuidium trachypodum** Bry. jav.

Syn. *Leskea trachypoda* Mitt. Musc. Ind. or p. 133.

On living trunk of tree, Kobo, c. fr. (n. 35954). On rock, alt. 800 ft., mouth of the stream north of Puak, c. fr. (n. 36038). Above the mouth of the Serpo river, alt. 1,800 ft., c. fr. (with n. 37319).

34. **Thuidium cymbifolium** Dz. & Mb.

On fallen log, hills south of Rotung, alt. 4,400 ft., st. (n. 36236).

28. Macrothamnium Fleisch.

35. Macrothamnium macrocarpum (Reinw. & Hornsch.) Fleisch.

On fallen trunk, south face of Bapu, alt. 3,800 ft., c. fr. (n. 36533). On decaying trunks on the ground, near the top of Bapu, alt. 5,400 ft., c. fr. (n. 36544).

Both these are slender forms, probably referable to *M. pseudo-striatum* (C. M.) Fleisch.; but I am quite unable to detect any characters sufficient to warrant its separation from *M. macrocarpum*, and M. Cardot shares this opinion with me. Fleischer retains it as separate, but has not indicated any distinguishing characters (Hedw. XLIV, 307). It is represented in Mitten's herbarium, but in letters which I have received from him he appears to have thought of it as only a more slender form of *M. macrocarpum*, as his note on the species (Musc. Ind. or. p. 114) also indicates. The distribution of *M. pseudo-striatum*, it may be noted, is identical practically with that of *M. macrocarpum*.

29. Campylium Bryhn.

36. Campylium glaucocarpon (Reinw.) Broth.

Syn. *Stereodon glaucocarpus* Mitt. Musc. Ind. or. p. 115.

On tree trunks, particularly on loose flakes of bark standing out from the trunk, Janak stream, c. fr. (n. 37303).

The specimen is in young and good fruit, and shows well the remarkable cœsious waxy excretion on the capsule and summit of the seta.

30. Ectropothecium Mitt.

37. Ectropothecium cyperoides (Hook.) Jaeg.

Syn. *Stereodon cyperoides* Mitt. Musc. Ind. or. p. 99.

On upper rocks of river bank, Janakmukh, c. fr. (n. 37161). On tree trunks, Janak stream, c. fr. (n. 37302).

E. cyperoides is a highly variable plant, as Mitten has pointed out (l. c.); but I am quite in agreement with M. Cardot, who has expressed the opinion to me in letters, that it will not include the Javan moss figured in Bry. jav. II, t. 294. I have examined carefully the original plants of Harvey's and others in Hooker's herbarium, and while finding there all the variation in leaf-form mentioned by Mitten, I find no forms with the leaves so shortly and widely pointed as figured in the Bry. jav., while the areolation there depicted is of quite a different character from that of *E. cyperoides*, in all forms of which it is extremely narrow, linear-vermicular, with a single marginal row usually very

slightly wider; and the cells remain almost unaltered to the base. The leaves vary from shortly acuminate and almost plane to a form with finely, almost filiform-acuminate leaves, strongly decurved and falcate, almost exactly as in *Stereodon cupressiformis*. The species appears to have a wide geographical range, and I can find no correlation between the form of leaf and the distribution. The length of seta and size of capsule also show considerable variability. I think there is no doubt that the Javan moss issued by Fleischer as *E. pseudo-cyperoides* Fleisch. n. sp. (M. Fr. Arch. Ind., No. 343) belongs to the true *E. cyperoides* (Hook). It is identical with "*E. cyperoides*, Ceylon, Gardner, No. 971," cited by Mitten, which in its turn is quite the same as several North Indian plants. The Javan plant described under this name in the Bry. jav. must, I feel assured, receive another designation; I have seen no specimens agreeing with the figures.

Var. **papillosum** Card. and Dixon var. nov.

Cellulœ superiores sœpe, prœcipue foliorum rameorum, *dense, argute, altiuscule papillosœ.*

On logs, above upper Rotung, alt. 2,500 ft., 23, Jan. 1912. c. fr. leg. Burkill (n. 36173) also n. 37301A without further localization.

E. cyperoides is described as having the cells occasionally papillose with the projecting ends of the upper cell walls, but in this case it is so much more highly developed as to seem worthy of varietal distinction. The cells are somewhat shorter than in the type in some leaves, but I do not find this a sufficiently constant character to be included in the diagnosis. The papillœ are somewhat less pronounced in 37301A.

31. Vesicularia C. Müll.

38. Vesicularia succosa (Mitt.) Broth.

Syn. *Stereodon succosus* Mitt. Musc. Ind. or. p. 101.

On a stone, under Rotung in the Dehong gorge, alt. 900 ft., c. fr. (n. 36154). On a fallen log, Kobo, c. fr. (n. 37091).

(The former specimen appears to be actually growing on *wood* as would be expected.) I have compared this with Mitten's co-type (no. 1038, Hooker) in the British Museum.

39. Vesicularia Montaguei (Bél.) Broth.

Running along the upper surface of a fallen and rapidly decaying log, Kobo, c. fr., det. Cardot (n. 37079). On rotten wood, Kobo, c. fr. (n. 37104).

32. Isopterygium Mitt.

40. Isopterygium taxirameum (Mitt.) Jaeg.

Syn. *Stereodon taxirameus* Mitt. Musc. Ind. or. p. 105

On sand, Janakmukh, c. fr. (n. 37263).

A large form, with rather long setœ and large capsules. M. Cardot writes of it " ne me paraît être qu'une des nombreuses formes de l' *I. taxirameum* (Mitt.), à peu près identique à celle que Müller a appeleé *I. taxirameoides*."

33. Rhynchostegiella Limpr.

41. Rhynchostegiella assamica Card. and Dixon sp. nov. (Plate II, fig. 7.)

Caulis reptans, ad terram arcte adhœrens, vage ramosus ; folia juniora lœteviridia, senilia *nigricantia*. *Folia* caulina sat conferta, erecto-patentia nec compressa, siccitate vix mutata, circa 1·5 mm. longa, e basi angustata, parum decurrente, *ovato-lanceolata acuta nec acuminata, paullo concava*, marginibus planis, *ubique conferte regulariter denticulatis* ; costa sat valida, ¾ folii longitudinem attingens, dorso in spiculum apicalem sœpe excedens. Cellulœ rhomboideo-lineares, subvermiculares, 30-40 μ longœ, 5-6 μ latœ, parietibus firmis ; apicem versus breviores, elongate ellipticœ, inferiores sensim laxiores, infimœ anguste rectangulares, alares *numerosœ, sat magnœ late breviter rectangulares, pellucidœ bene notatœ*. Folia ramea minora, *minus acuta vel obtusiuscula, siccitate marginibus involutis sub-tubulosis* (interdum ramuli tenerrimi angustifolii subflagelliformes inveniuntur).

Autoica. Perichœtium parvum, bracteis erecto-patentibus vel recurvis, argute acuminatis, fortiter denticulatis vaginula elongata. Seta tenuis, rubra, *lœvis* (interdum prope apicem obscure humiliter sub-scaberula seu rugulosa), 1—1·25 cm. longa. Theca parva pallida, breviter turgide ovata, curvata, cernua, operculum *acute decurvato-rostratum*.

Hab. Kekar Monnying, Abor District, alt. 800 ft., on silted earth on tree trunks, 15th Jan. 1912, leg, Burkill (n. 36044). On stem of *Ficus pyriformis* var. and stones near the stem, alt. 1,200 ft., gorge of the Yambung, 9th Jan. 1912 (n. 37766).

This rather uninteresting little plant is placed by M. Cardot in the Section Lepto-rhynchostegium of Brotherus, but does not seem quite at home there, any more than in Eu-rhynchostegiella. The cells are somewhat long for the former section, and the leaves scarcely concave. The limits between Rhynchostegiella (especially the Section Lepto-rhynchostegium) and Eurhynchium seem very ill-defined, and it is doubtful whether the separation can be maintained.

The other Indian species of the genus have the leaves widely spreading or squarrose with long acute points and a scabrous seta. The

blackish colour of the older leaves, and the pale green of the younger branch leaves which are strongly enrolled and subtubular when dry, give the plant a distinct appearance.

34. **Rhynchostegium** Schpr.

42. Rhynchostegium herbaceum (Mitt.) Jaeg.

Syn. *Hypnum herbaceum* Mitt. Musc. Ind. or. p. 81.

On fallen tree trunks and branches, Kobo, c. fr. (n. 35989, 37070 bis, 37099). On decayed stump, above the Egar stream, alt. 3,400 ft., c. fr. (n. 36103). On rotten branch on the ground, alt. 1,000 ft., Yambung to Sissin, st. (n. 36018).

Explanation of Plates.

Plate I.—Fig. 1. *Cyathophorum Burkillii. a,* stem of ♂ plant, nat. size *b,* portion of stem, under side × 3. *c, c,* leaves × 4. *d, d.* amphigastria × 4. *e,* upper median cells × 250. *f,* calyptra × 8. *g,* lid × 8. *h,* marginal cells × 200.

Fig. 2. *Symphyodon complanatus. a,* stem nat. size. *b,* stem leaf × 20. *c,* branch leaf × 20. *d,* upper cells × 2Ɩ0. *e,* capsule × 10. *f,* apex of perichœtial bract × 40.

Fig. 3. *Symphyodon scabrisetus. a,* stem leaf × 20. *b,* branch leaf × 20. *c,* apex of perichætial bract × 40. *d,* capsule × 10. *e,* portion of upper part of seta × 40.

Fig. 4. *Mnium rostratum. a,* upper marginal cells × 200.

Fig. 5. *Mnium succulentum* (Burkill, no. 37177). *a,* upper marginal cells × 200.

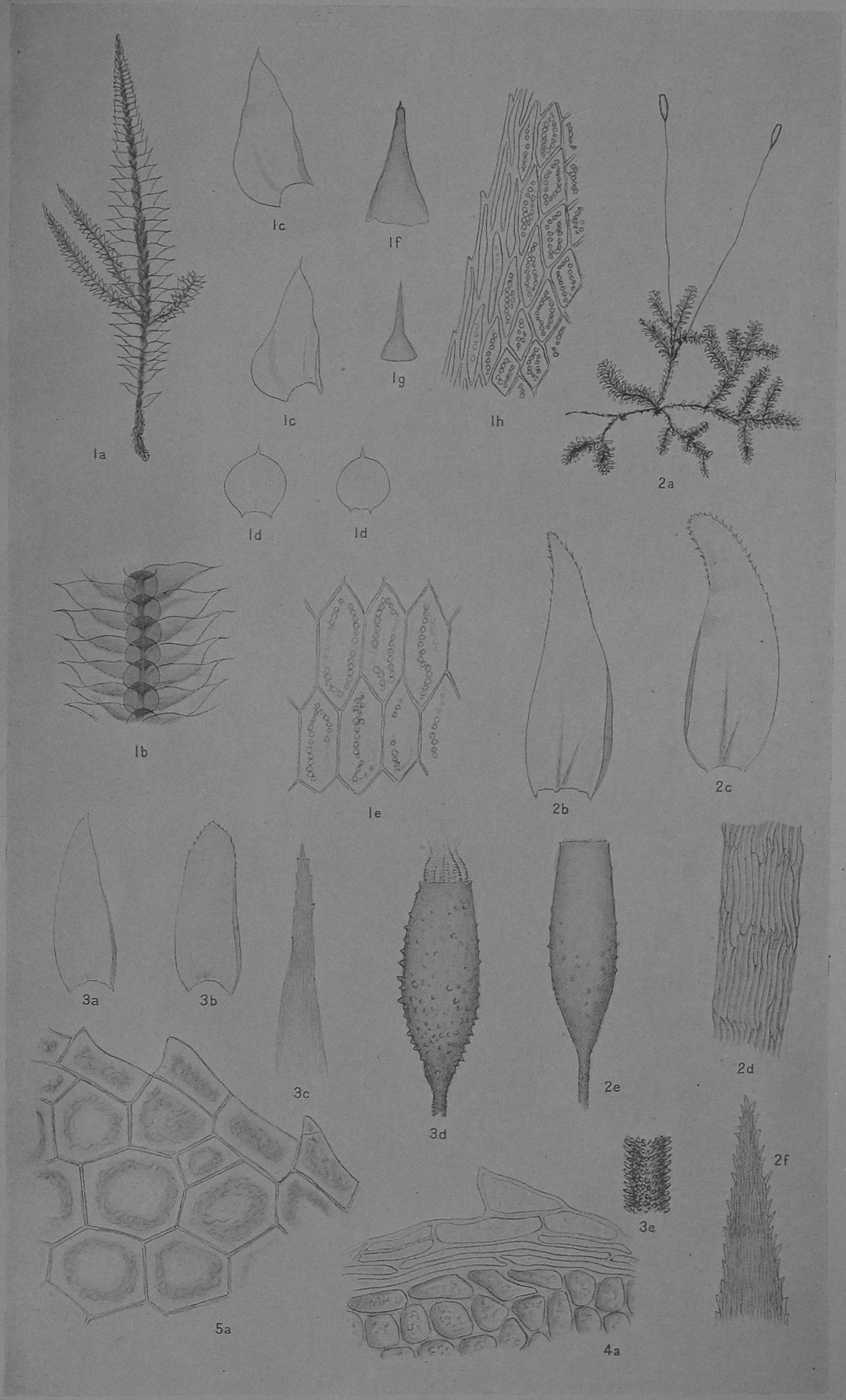
Plate II.—Fig. 5. *Mnium succulentum* (Assam, leg. Griffith). *b, c, d,* marginal cells near apex × 50. *e,* do. at mid-leaf.

Fig. 6. *Leskea perstricta. a,* plant, nat. size. *b,* stem leaf × 20. *c, c,* branch leaves × 20. *d,* perichœtium × 10. *e,* capsule × 5. *f,* outer, *g,* inner perichœtial bracts, × 10. *h,* upper leaf cells × 200. *i,* alar do. × 200.

Fig. 7. *Rhynchostegiella assamica. a,* stem, nat. size. *b, b,* stem leaves × 20. *c, c,* branch leaves × 20. *d,* apex of stem leaf × 150. *e,* upper cells × 200. *f,* capsules × 4.

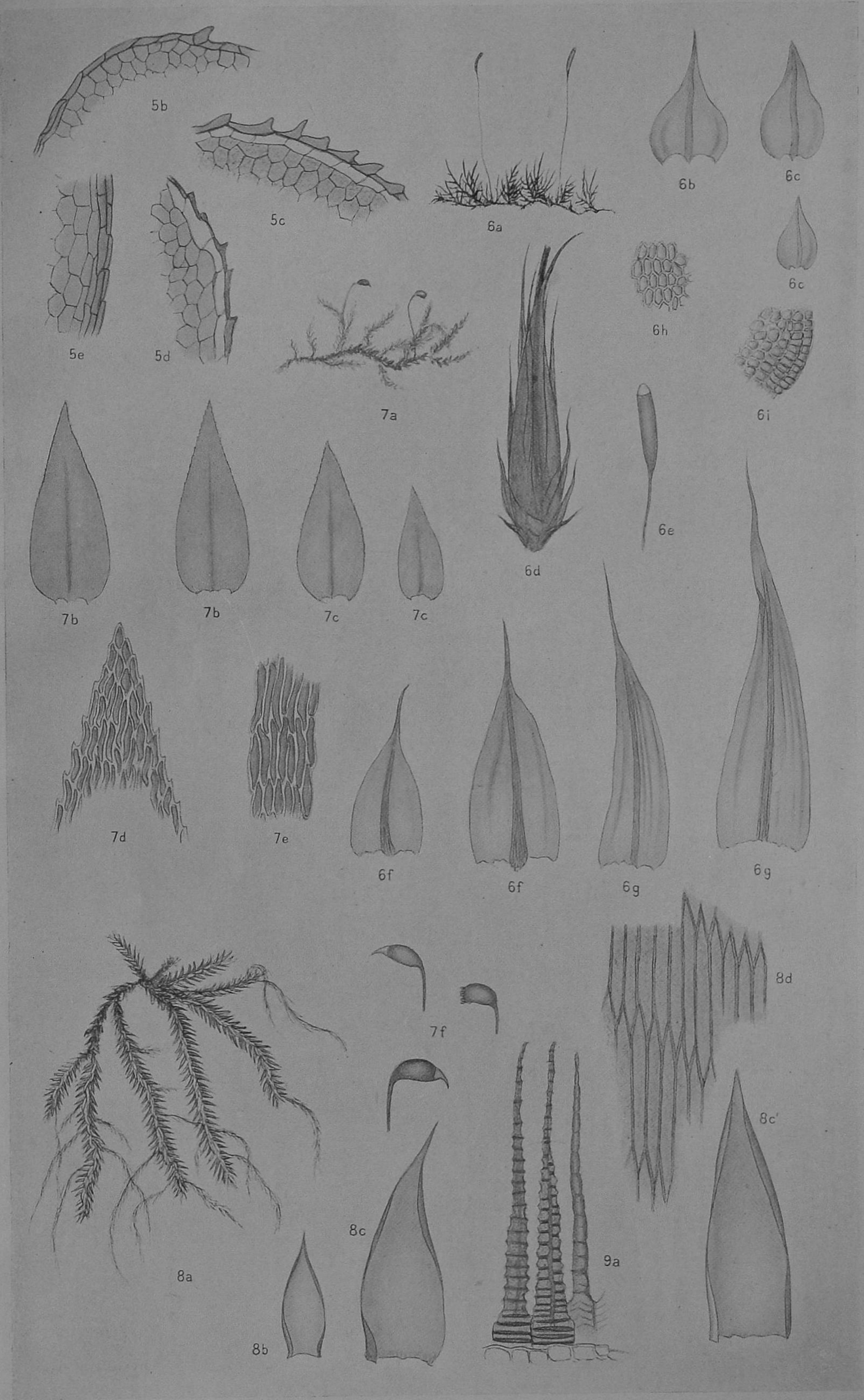
Fig. 8. *Barbella enervis* (Burkill, no. 36039). *a,* stem, nat. size. *b,* leaf of secondary stem × 10. *c, c,* do. (somewhat flattened out) × 20. *c,* upper cells × 200.

Fig. 9. *Cyathophorum Burkillii,* peristome × 80 (*left,* outer tooth, ventral surface; *middle,* do., dorsal surface; *right,* process of endostome).



del. H. N. Dixon. West, Newman proc.

ABOR MOSSES.



del. H. N. Dixon. West, Newman proc.

ABOR MOSSES.

REPORT ON THE MOSSES COLLECTED BY MR. C. E. C. FISCHER AND OTHERS FROM SOUTH INDIA AND CEYLON

BY

H. N. DIXON, M.A., F.L.S.

The subject of this report is partly a collection of mosses made by Mr. C. E. C. Fischer, Deputy Conservator of Forests in Coimbatore, placed in my hands for determination by the authorities of the Royal Botanic Garden, Calcutta, together with a further collection of Mr. Fischer's which reached me through the Rev. E. Blatter, S. J. These were gathered, some in the Palni Hills, others in various parts of the hilly district of Coimbatore.

I have further included a number sent from the Western Ghats, by Mr. L. J. Sedgwick, on whose collections I have already reported in several articles in the Journal of Botany; a small collection made by Father Queste, partly in Ceylon, partly at Shembaganur, in the Madura district, in 1911; with finally a few collected in 1898 by Mr. J. H. Darrell in Ceylon. All the gatherings from continental India were (with the exception of Mr. Sedgwick's) made, therefore, probably between the 10th and 12th parallels of latitude.

1. **Dicranum** Hedw.

1. **Dicranum fragile** Hook.

Shembaganur leg. Queste, c. fr. (no. 6).

This species has hitherto been recorded from North India (Nepal and Khasia); but M. Cardot, by whom it was determined, has received it from more than one locality in this part of India.

2. **Leucoloma** Brid.

2 **Leucoloma amœne-virens** Mitt. Musc. Ind. or., p. 13.

Unnasgiriya, Central Provinces, Ceylon, leg. Queste, st. (n. 31).

3. **Leucoloma Walkeri** Broth. VAR. **stenocarpum** Card. and Dixon, var. nov. (Plate I, Fig. 2.)

Seta *longior*, 8-10 mm. alta; theca cylindrica, *1·75—2·5 mm, longa.*

Kyanktalon, Mergui, Burma; on wood, Mar. 1911, c. fr., leg. A. Meebold (n. 16616).

I have included this plant in the present report, on account of its geographical relationships. *L. Walkeri* was described by Brotherus in this publication (Volume I, 1899; Contrib. to the Bryol. Flora of S. India, p. 313), from South Coorg, leg. Dr. Walker. The seta is described as "6 mm. alta," the capsule as 'c. 1·5 mm., anguste subcylindrica.' Meebold's plant agrees precisely with *L. Walkeri* as to the gametophyte, the longer seta and capsule being the only differentiating characters observable. It seems undesirable therefore to consider the two plants specifically distinct. Herzog (in Hedwig. L., 121) has published an allied species, *L. Herzogii* Broth., allied to *L. Walkeri*, only differing in certain vegetative characters (leaves subsecund, entire, border stronger and reaching higher in the leaf); but the fruit has not been found.

Walkeri also occurs in Mitten's herbarium from Moulmein, Burma, leg. Parish (n. 32), under the herbarium name *L. erosum*.

3. **Campylopus** Brid.

4. Campylopus (*Pseudo-campylopus*) **pseudo-gracilis** Card. and Dixon sp. nov. (Plate I, Fig. 1.)

Camp. gracili (Mitt.) affinis, *robustior*, 3-4 cm. altus, superne læte-viridis, infra *nigrescens;* caulis erectus, *substrictus*, inferne *rufo-radiculosus*. Folia *stricta*, suberecta, *minus attenuata*, *sicca haud flexuosa*, 5-7 mm. longa, integerrima vel in summo apice bis terve minute denticulata. Costa basin versus $\frac{2}{3}$-$\frac{3}{4}$ latitudinis folii, cellulœ alares tenuissimæ, hyalinœ, rarius coloratœ, supra-alares angustissimœ, lineares, pellucidœ limbum *pallidum obliquum* efformantes per totam longitudinem partis basilaris folii protractum *ab internis* (*juxta-costalibus*) *brevioribus chlorophyllosis sæpe rhomboideis bene delimitatum*. Cetera desunt.

Hab. Unnasgiriya, Central Provinces, Ceylon, 1911, leg. Queste (n. 32).

This species belongs to the small Section or Subgenus Pseudo-campylopus distinguished by the absence of stereid cells from the nerve, which shows in section usually two ventral series of large, empty cells, and one or two (in this case usually two) series of smaller cells, less thin-walled but not incrassate nor sub-stereid, and moderately large. Its only near Indian allies are *C. gracilis* (Mitt.) and C. *subfragilis* Ren. and Card. It is without doubt nearly allied to the former, but seems to be well marked in the much more robust habit, dark colour, more rigid stems and leaves; and the clearly defined band of narrow pellucid marginal cells, extending outwards and upwards for a considerable height in the leaf, appears a good character; the marginal cells in *C. gracilis* are similar, but they pass gradually into the juxta-costal cells both at the base and higher up in the

leaf, and hence form neither a distinctly marked nor an obliquely ascending band; the cells too seem to be all of one character, rectangular throughout, while in the present case the upper cells of the expanded part are obliquely rhomboid, chlorophyllose and obscure, thus rendering still more pronounced the delimitation of the border cells. *C. subfragilis* is still smaller and more delicate than *C. gracilis.*

5. **Campylopus lætus** (Mitt.) Jaeg.

Syn. *Dicranum lætum* Mitt. Musc. Ind. or., p. 19.

Shembaganur, Madura, leg. Queste, st. (n. 20). This plant shows some difference in its areolation from that presented by most specimens of *C. lætus*, the upper cells being subquadrate, the alar cells smaller, more numerous and more highly coloured; the upper areolation in *C. lætus* being, frequently at least, obliquely oval or oval-rhomboid. The type of *C. lætus* is Hooker's Khasian plant (No. 84), which I have examined at the British Museum. The upper areolation there, while mostly of the oblique, rhomboidal form, varies a good deal and the cells are frequently quite irregular in outline; in the Madura plant they are equally variable, and in some leaves are quite identical with some of the leaves of the type. The habit in the type specimen is somewhat more rigid, but other specimens, including some at Kew probably determined by Mitten, are identical in this respect. Altogether I have no hesitation in referring the Madura plant to *C. lætus.*

I have also received it from Mahableshwar, Western Ghats, leg. Sedgwick, 1909, st. (n. 39), a shorter, more rigid form, more exactly recalling the habit of the Nepal plant.

4. **Leucobryum** Hpe.

6. **Leucobryum Bowringii** Mitt. Musc. Ind. or., p. 26.

Shembaganur, leg. Queste, st. (n. 16); Unnasgiriya, Central Provinces, Ceylon, alt. 4,950 ft., leg. Queste, st. (n. 24).

5. **Fissidens** Hedw.

7. **Fissidens diversifolius** Mitt. Musc. Ind. or., p. 140.

In an article published in the Journal of Botany (1909, p. 158), I recorded *Fissidens* (*Semi-limbidium*) *Walkeri* Broth. as collected by Sedgwick at Walwa, Kistna River, 1908, mentioning that it showed a slight difference from Brotherus' description. A further specimen of what was evidently the same moss was sent later from Waishakhan, Western Ghats, leg. Sedgwick, 1909 (n. 29), differing, however, in

some slight characters, as pointed out in a subsequent article (Journal of Botany, 1910, p. 305). What I did not observe in this second specimen was that the leaves were in most cases entirely borderless, and M. Cardot to whom I sent a part of the latter plant recognised in it a species of *Aloma*, and not, therefore, identical with *F. Walkeri*, of which he possessed a part of the type gathering, and which has smaller and much more obscure areolation than Mr. Sedgwick's moss. The latter was referred to *F. diversifolius* Mitt., to which it undoubtedly belongs, and M. Cardot agrees with me that the Kistna River specimen, in spite of the distinct border prevailing on the vaginant lamina, must be referred there also. The areolation is of a type prevalent in *Aloma* rather than in *Semilimbidium*; and moreover the presence of a border must be looked upon as quite exceptional or indeed abnormal in this species. I have referred to the variability it exhibits in other respects, and the peculiarity of its habitat, on a previous page, in my Report on the mosses of the Abor expedition.

8. **Fissidens bryoides** Hedw.

Side of a cave, Fort Purandhar, Western Ghats, October 1910, leg. Sedgwick, c. fr. (n. 115).

I am unable to separate this from our European plant; some of the capsules—not all—are slightly curved or cernuous, but in all other respects, including the axillary male inflorescence, it presents no differences.

6. Pottia Ehrh.

9. **Pottia vernicosa** Hampe.

On chunan walls, Bombay, December 1910, leg. Lieutenant-Colonel Kirtikar, c. fr.

7. Hyophila Hpe.

10. **Hyophila subflaccida** Broth. and Dixon.

On tiles of a roof, Satara, Deccan, leg. Sedgwick, c. fr. (n. 142).

8. Schlotheimia Brid.

11. **Schlotheimia Grevilleana** Mitt. Musc. Ind. or., p. 53.

Shembaganur, Madura, leg. Queste, c. fr. (n. 20d).

9. Macromitrium Brid.

12. **Macromitrium sulcatum** Brid.

Iyarpadi, Anaimalai Hills, on tree trunk, alt. 4,000 ft., January 1912, leg. Fischer, c. fr. (n. 3,267); on Shola trees on the Kundahs, Nilgiri Hills, February 1911, leg. Fischer, c. fr. (n. 18, 23); Unnasgiriya, Central Provinces, Ceylon, 1911, leg. Queste c. fr. (n. 23).

10. Funaria Schreb.

13. Funaria physcomitrioides Mont.

Syn. *Entosthodon physcomitrioides* C. M., Mitt. Musc. Ind. or., p 55. Upper Palnis, alt. 8,100 ft., September. 1911, leg. Fischer, c. fr. (n. 3017).

14. Funaria hygrometrica Sibth.

Altakatti, Anaimalai Hills, December 1911, leg. Fischer, c. fr. (n. 3211).

Var. *calvescens* B. and S.

Shembaganur, leg. Queste, c. fr. (n. 17).

11. Pohlia Brid.

15. Pohlia elongata Hedw.

Sholas, Kundahs, Nilgiri Hills, February 1911, leg. Fischer, c. fr. (n. 19).

P. elongata is known from the Himalayas, but I do not know that it has been recorded from south of that range in India.

12. Brachymenium Hook.

16. Brachymenium leptostomoides (C. M.) Schimp.

Syn. *Bryum leptostomoides* C. M., Mitt. Musc. Ind. or., p. 74.

Kukal, Upper Palnis, about 6,300 ft. alt., on tree trunk, leg. Fischer, c. fr. (n. 2986); and Upper Palnis, on trunk of tree in the open, alt. 6,200 ft.. c. fr. (n. 3062), this latter a fine and very beautiful form, with large, elongate capsules, quite recalling *Leptostomum gracile* or *L. inclinans* of New Zealand; near Kandy, Ceylon, 1911, leg. Queste, c. fr. (n. 11, 12, 15).

17. Brachymenium exile (Dz. and Mb.) Bry. jav.

Kavungi, Upper Palnis, on stone steps of rest-house, leg. Fischer, c. fr. (n. 3060); Kodikanal, Upper Palnis, on rocks, 6,800 ft. alt., leg. Fischer, c. fr. (n. 3065a), earthy bank, Fort Purandhar, Western Ghats, 1911, leg. Sedgwick, c. fr. (n. 126). It is perhaps worth noting that the capsules before they are fully ripe have the narrower outline of those of *B. coarctatum*.

13. Bryum Dill.

18. Bryum sahyadrense Card. and Dixon.

In crevices of a stone wall, Purandhar, Western Ghats, leg. Sedgwick, c. fr. (n. 134).

19. **Bryum retusifolium** Card (ined.) VAR. **heterophyllum** Card.
Shembaganur, Madura, leg. Queste, 1911, st. (n. 20a); det. Cardot.

20. **Bryum argenteum L.** VAR. **lanatum** B. and S.
Rocks, Upper Palnis, 6,800 ft, alt.; and Attakatti, Anaimalai Hills, alt. 3,000 ft., leg. Queste. (n. 3065, 3210).

Var. australe Rehm. (cf. Journ. of Bot., 1911, p. 148).
Shemburuve, Anaimalai Hills, alt. 4,500 ft., on rocks in evergreen forest, leg. Fischer, c. fr. (n. 3412).

21. **Bryum ramosum** (Hook.) Mitt. Musc. Ind. or., p. 75.
Rock, Gundara river bank, Upper Palnis, alt. 6,300 ft., and Kodikanal, alt. 6,900 ft., on banks in evergreen forest, leg. Fischer, c. fr. (n. 3052, 3075); Shembaganur, leg. Queste (n. 3a, 10, 13).

22. **Bryum Wightii** Mitt. Musc. Ind. or., p. 74.
Syn. *B. strigosum* Wils. nomen.
Satara, Western Ghats, 1911, leg. Sedgwick st. (n. 139).

14. Rhizogonium Brid.

23. **Rhizogonium spiniforme** (L.) Bruch.
Upper Palnis, alt. 7,000 ft., c. fr. (n. 2988, 3074); Shemburuve, Anaimalai Hills, alt. 4,600 ft., c. fr. (n. 3411), all leg. Fischer.

15. Pogonatum P. Beauv.

24. **Pogonatum microstomum** (R. Br.) Brid.
Upper Palnis, alt. 7,000 ft., leg. Fischer, c. fr. (n. 2987, 3050, 3080).

25. **Pogonatum aloides** (Hedw.) Beauv.
Karungi, Upper Palnis, alt. 6,300 ft., leg. Fischer, c. fr. (n. 2997).

26. **Pogonatum hexagonum** Mitt. Musc. Ind. or., p. 151.
Upper Palnis, on banks of stream, alt. 6,800 ft., leg. Fischer, c. f. (n. 3059). I was at first in some doubt as to the identity of this with Mitten's plant, as he describes the capsule as "plicis subindistinctis sex exarata," while the mature capsules here were deeply plicate. On comparing Hooker's specimens of *P. hexagonum* and others cited by Mitten, however, I found that these too showed a strong plication of the capsules when fully mature and empty. The capsule in this and no doubt in other similar species goes in fact through several stages; when dry and empty it is, as indicated, somewhat deeply ribbed and furrowed; when fully mature but not over-ripe, it is as Mitten describes it, indistinctly plicate; at an earlier stage still, *viz.*, when about mature and still

operculate, it will generally be found to show six slightly elevated, narrow ribs, with no furrows between; before this it goes through a stage when there are no visible ribs on the surface, and it is quite terete, while in a still younger state and when semi-translucent, the ribs may be made out faintly by the aid of a strong transmitted light.

27. **Pogonatum Teysmannianum** (Dz. and Mb.) Bry. jav.

Iyarpadi, Anaimalai Hills, alt. 4,000 ft., on a bank, leg. Fischer, c. fr. (n. 3266). *P. Teysmannianum* is placed by Brotherus in a Section with those species having the lamellæ with 3-4 rows of cells; while Mr. Fischer's moss has 6-7. I find however Javan specimens in the Brit. Museum collection that have 5-6 and perhaps 7 rows of cells, and with these no. 3266 agrees exactly.

28. **Pogonatum Junghuhnianum** (Dz. & Mb.) Bry. jav.

Shembaganur, leg. Queste, c. fr. (n. 8).

16. **Erpodium** Brid.

29. **Erpodium mangiferæ** C. M.

Close growing on the bark of smooth trees, Satara, Western Ghats, leg. Sedgwick, c. fr. (n. 141).

17. **Braunia** Brch. & Schpr.

30. **Braunia indica** (Mont.) Par.

Syn. *Hedwigia indica* Mitt. Musc. Ind. or., p. 123.

Gundara river bank, Palnis, alt. 6,300 ft., leg. Fischer, c. fr. (n. 3051). Growing in magnificent sheets, richly fruiting.

18. **Pterobryopsis** Fleisch.

31. **Pterobryopsis aurantia** (C. M.) Fleisch.

Syn. *Pterobryum ceylanicum* Thw. and Mitt in Journ. Linn. Soc., Botany, XIII, 315.

Unnasgiriya, Central Prov., Ceylon, alt. 4,950 ft., leg. Queste, st. (n. 23)—a fine, robust form. Fleischer has reduced *P. ceylanicum* Thw. and Mitt. to this species. It may be noted that Mitten in his description of that plant in describing the cells writes "basalibus nullis diversiformibus!" I find the alar cells well differentiated and of a deep orange colour in the plant here recorded, as also in a specimen collected in Ceylon by Miss Bamforth, and determined (as *Pterobryum ceylanicum* Thw. and Mitt.) by Brotherus; and this agrees precisely with a specimen of *Endotrichum aurantium* in the British Museum collection, I believe from C. Müller's herbarium.

19. Aerobryidium Fleisch.

32. Aerobryidium attenuatum (Thw. and Mitt.) Fleisch.

Syn. *Meteorium attenuatum* (Thw. and Mitt.) in Journ. Linn. Soc., Botany, XIII, 316.

Nuwara-Eliya, Ceylon, March 1898, leg. J. H. Darrell, st. (n. 146). This appears to be a rare species, confined to Ceylon. I have a further Ceylonese specimen sent me by Rev. C. H. Binstead, collected in 1897 by Mrs. E. J. Dew, and determined by Mitten.

20. Papillaria C. Müll.

33 Papillaria sp.

Unnasgiriya, Central Provinces, Ceylon, alt. 4,950 ft., leg. Queste, st. (n. 26).

This agrees exactly with *P. Bamforthiæ* Broth., ined., to which I have referred in Journ. of Bot. 1912, p. 148. As however the character there mentioned (the position of the papillæ on the cell face) is certainly variable, it is doubtful whether the species can be maintained as distinct from *P. fuscescens*, in which case it is perhaps best referred to var. *crassiramea* Ren. and Card.

21. Barbella Fleisch.

34. Barbella Questei Card. and Dixon sp. nov. (Plate I, Fig. 3.)

Foliorum forma structuraque *B. Determesii* Ren. and Card. omnino fere similis, habitu autem longe aliena. Caulis secundarius pro more brevis 5-8cm. longus, *parce irregulariter ramosus, sat robustus, rigidiusculus,* una cum foliis 4-5 mm. latus, ramis, 2-3 cm. longis, haud attenuatis; colore stramineo, ætate rufo-fusco, subnitido. Folia *et caulis secundarii et ramorum sub-complanata,* stricta, lateralia valde patentia, interdum leniter homomalla, superiora et inferiora erecta, appressa; omnia 3-4 mm. longa, *concava,* e basi deltoidea, amplexicauli, subauriculata oblongo-lanceolata, sensim (nonnunquam abruptius) in acumen longum subfiliforme angustata, per totum fere marginem, prœcipue apud basin; minute indistincte remote denticulata, costis *binis brevissimis vel obsoletis,* cellulis anguste rhomboideo-linearibus basin versus laxioribus, alaribus numerosis, distinctis majusculis, omnibus dorso *omnino lævibus.* Cetera ignota.

Hab. Shembaganur, Madura, 1911, leg. Queste (n. 14).

This plant, as M. Cardot points out, is in the form and structure of the leaves almost identical with *B. Determesii* Ren. and Card., which also has been found in Madura; that species however has the leaf cells

generally lightly papillose, and the habit entirely different, having long, flexuose stems with the leaves more or less appressed, and numerous spreading branches, as in *B. javanica*. The habit and colour of the present plant is more like that of *B. spiculata* (Mitt.), which, however, apart from the single nerve and other structural differences, has more distant leaves and a softer, less rigid texture. *B. Kurzii* has quite different leaf base and alar cells. *B. subulifera* Fleisch., from the description has, with a very similar leaf-structure, a much more slender and delicate habit, more or less appressed stem leaves, etc.

22. **Bryosedgwickia** Card. and Dixon.

35. **Bryosedgwickia Kirtikarii**. Card. and Dixon.

Castle Rock near Goa, S. W. India, leg. Gammie, comm. Sedgwick, c. fr. (n. 138).

23. **Erythrodontium** Hampe.

36. **Erythrodontium julaceum** (Hook.) Par.

Syn. *Stereodon juliformis* Mitt. Musc. Ind. or., p. 92.

Lower Punächi, Anaimalai Hills, alt. 2,800 ft., c. fr. (n. 3231), and Attakatti ; Anaimalai Hills, alt. 3,500 ft. c. fr. (n. 3239), leg. Fischer ; Shembaganur, leg. Queste. c. fr. (n. 20b) Attapadi Hills, alt. 1,900 ft. leg. Fischer, c. fr. (n. 11).

24. **Entodon** C. Müll.

37. **Entodon plicatus** C. M.

Syn. *Stereodon plicatus* Mitt. Musc. Ind. or., p. 106. Shembaganur, leg. Queste, c. fr. (n. 5).

25. **Levierella** C. Müll.

38. **Levierella fabroniacea** nov. var. **dilatatinerve** Card. and Dixon. *Robustior*, folia *majora*, costa *valida*, ad 50 μ lata juxta basin, dimidiam partem versus raptim attenuata, nonnunquam furcata.

On wall in loose mats growing downwards, Purandhar, W. Ghats, May 1911, leg. Sedgwick, c. fr. (n. 132).

In addition to the characters given above M. Cardot points out that the peristome teeth have on the dorsal surface a thickening along the commissural line, with lateral branches on each side, usually opposite one another, forming a kind of false lamellæ. I find this character,

though perhaps usually present, at times very inconspicuous or wanting, so have not included it as a varietal character. M. Cardot also has detected traces of an inner peristome (as described by Carl Müller). He also points out that Brotherus' diagnosis "Alarzellen nicht differenziert" is incorrect, as indeed his figure indicates where the numerous subquadrate alar cells are well shown.

26. **Stereophyllum** Mitt.

39. Stereophyllum Blatteri Card. ined.

On Bhendi bark (*Thespesia populnea*) Matheran, Thana District, Bombay, October 1906, leg. Lieut.-Col. K. R. Kirtikar, c. fr. (n. 73a).

This very well marked new species of Stereophyllum was sent to Brotherus, and it was intended naming it after the finder; the description indeed was drawn up. It subsequently transpired however that the same species had been sent to M. Cardot independently by Rev. E. Blatter, collected at Khandala in October 1909, and had been named as above, and it will receive publication under that name shortly.

40. Stereophyllum ligulatum (C. M.) Jaeg. (Plate II, Fig. 7).

Syn. *Hypnum ligulatum* C. M., Mitt. Musc. Ind. or., p. 82.

Stem and roots of a tree, Mahableshwar, W. Ghats, January 1909, c. fr. (n. 24), and trees, Fort Purandhar, Poona District, May 1910, c. fr. (n. 91, 96), both leg. Sedgwick. On fallen tree trunk, 2,500 ft. alt., Bolampatti Hills, Coimbatore, May 1911, leg Queste, c. fr. (n. 24).

Sedgwick's plant (n. 24) was kindly compared with C. Müller's type (*Euglossophyllum ligulatum*) at Berlin by Herr L. Loeske, and found to be identical.

A noteworthy feature in this and probably in other species of the genus is that in the lateral, asymmetrical leaves the enlarged alar cells are very unequally and irregularly distributed; frequently all the cells on one side of the nerve base will be of this character, while on the other side all the cells will be linear except one to two marginal rows.

VAR. NOV. **Sedgwickii** Broth. and Dixon (Plate II, Fig. 8).

Perrobustum; caulis ad 5-8 cm. longus, vage ramosus, folia *magna*, ad 2·25 mm. longa, 1 mm. lata, *concava*, elliptica, obtusa vel subobtusa, integra vel interdum ad summum apicem crenulata.

On a tree, Panchgani, W. Ghats, 4,000-4,500 ft. alt., 1909, leg. Sedgwick, st. (n. 48).

The size and habit, and the very concave leaves with rather more obscure, chlorophyllose areolation gave this a very distinct appearance,

and it was supposed at first to be a new species. It seems however to be scar ely separable specifically from *S. ligulatum*, but is at any rate a very pronounced variety.

27. Rhacopilum P. Beauv.

41. Rhacopilum Schmidii (C. M.) Jaeg. VAR. **breviaristatum** Card. ined.
On trunk of coffee-bush, Palni Hills, alt. 5,000 ft., leg. Fischer, c. fr. (n. 2990).

28. Herpetineuron Cardot.

42. Herpetineuron Toccoœ (Sull. and Lesq.) Card. NOV. VAR. **excurrentinerve** Card. and Dixon.
Costa in cuspidem brevem excurrens.
Shembaganur, leg. Queste, st. (n. 20 c). The typical form has the nerve ceasing just below the leaf apex.

29. Thuidium Schpr.

43. Thuidium glaucinum (Mitt.) Jaeg.
Syn. *Leskea glaucina* Mitt. Musc. Ind. or., p. 133.
Shembaganur, leg. Queste, st. (n. 19); Nuwara-Eliya, Ceylon, 1898, leg. J. H. Darrell, st. (n. 149). Upper Palnis, leg. Fischer (with n. 2989)—a fragment mixed with *Ctenidium lychnites*.

30. Macrothamnium Fleisch.

44. Macrothamnium submacrocarpum (Hampe) Fleisch.
Shembaganur, leg. Queste, c. fr. (n. 4).

31. Ctenidium Schpr.

45. Ctenidium lychnites (Mitt.) Broth.
Syn. *Stereodon lychnites* Mitt. Musc. Ind. or., p. 114.
Upper Palnis, alt. 6,400 ft., st. (n. 2989); and Kodikanal, Upper Palnis, on banks in evergreen shola, alt. 7,000 ft., c. fr. (n. 3077); leg. Fischer. These plants represent a rather robust, rigid form. Near Galle, Ceylon, 1898, leg. Darrell, st. (n. 153.)

32. Ectropothecium Mitt.

46. Ectropothecium cyperoides (Hook.) Jaeg.
Syn. *Stereodon cyperoides* (Hook.) Mitt. Musc. Ind. or., p. 99.
Shembaganur, leg. Queste, c. fr. (n. 1).

This was at first referred to *E. pseudo-cyperoides* Fleisch., with which it certainly agrees. Subsequent correspondence with M. Cardot however led to the conclusion that this could not be separated from Hooker's plant, as I have remarked on a previous page, in my report on the mosses of the Abor Expedition; where I have attempted to show that the Javan plant described and figured as *H. cyperoides* in the Bry. javanica is a different thing from the Indian and Ceylonese plant of Hooker. Fleischer no doubt was led to describe the Ceylonese *E. pseudo-cyperoides* as new, by recognizing its difference from the Javan species; it is, however, identical with certain forms of *E. cyperoides* (Hook.), and must, I think, without doubt be transferred there. It is the Javan plant which requires re-naming.

33. Trichosteleum Mitt.

47. Trichosteleum cylindricum (Reinw. and Hornsch.) Broth.

Unnasgiriya, Central Provinces Ceylon, 1911, leg. Queste, c. fr. (n. 25).*

48. Trichosteleum monostictum (Thw. and Mitt.) Broth.

Syn. *Sematophyllum monostictum* Thw. and Mitt., Journ. Linn. Soc., Botany, XIII, 318.

VAR. NOV. **lævius** Dixon.

Papillœ foliorum multo minores, indistinctœ.

The leaves of *T. monostictum* are highly papillate, though varying in degree; in the present plant they are also somewhat variable, the leaves being at times almost smooth; in other respects it seems to agree exactly.

Hab. In dense mats on the roots of trees, Mahableshwar, W. Ghats, January 1909, leg. Sedgwick, c. fr. (n. 21).

34. Taxithelium Mitt.

49. Taxithelium (*Anastigma*) **vivicolor** Broth. and Dixon sp. nov. (Plate I, Fig. 4.)

Late intricate cœspitosum, humile, subnitens, *saturate viride*, ætate fuscescens; caulis vage laxe ramosus, 3-4 cm. longus, tenellus. Folia octofaria, *parva, raro 1 mm. longa, dimorpha*; alia *undique imbricata, concava, late ovata vel oblongo-ovata*, valde obtusa vel rarissime subacuta, superne sat argute minute denticulata; alia, prœcipue ramulorum, *valde complanata, plana, rotundato ovata vel breviter spathulata, interdum suborbicularia*, minute crenulata, viridissima; omnia enervia vel nervis binis tenuissimis brevibus inconspicuis praedita. Cellulœ, breviter lineares, vermiculares, parietibus firmis, 20-30μ longœ, juxta apicem

* Since this was in type I find the plant is *Rhaph. leptorrhynchoides* (Mont.).

breviores, latiores, sinuoso-rhomboideæ, basin versus majores, medio lineares, ad angulos 3-4 seriebus rectangulares, parum distinctæ; eæ foliorum ramulorum ubique multo breviores, late rhomboideo-ellipticæ, parietibus tenuioribus; omnes vel *omnino læves vel parietibus apice indistincte prominentibus obsolete scabriusculæ.* Cetera ignota.

Hab. On stones in the bed of a torrent, Mahableshwar, Western Ghats; alt. circa 4,000 ft., January 1909, leg. Sedgwick. M. Cardot sends it to me also gathered by M. Foreau, at Shembaganur, Madura, in 1911.

A very distinct species, growing on stones overflowed by running water, and conspicuous by its bright green colour, and rounded, subdistichous leaves, giving the branches at first sight the appearance of a minute Homalia, or of *Lejeunea serpyllifolia.* Other plants—perhaps from a less submerged station—have these characters less marked, with brown, imbricated leaves of the form first described in the diagnosis. Apart from the above characters it differs from its nearest allies, *T. glossoides.* (Bry. jav.) and *T. similans* (Bry. jav.) in the wider, rounder leaves with different basal areolation and finer apical denticulation. *T. lingulatum* Card. from Formosa has somewhat similarly shaped leaves, but is much more robust, and the habit, texture and toothing of the leaves are totally different.

35. **Rhaphidostegium** Schpr.

50. Rhaphidostegium subhumile (c. m.) Jaeg.

Syn. *Stereodon subhumilis* (c. m.) Mitt. Musc. Ind. or., p. 102.

Kodikanal, Upper Palnis; on trunk of rosebush, alt. 6,700 ft., and on banks, alt. 7,000 ft., leg. Fischer, c. fr. (n. 2985, 3076). I have no doubt the determination is correct, though I have not compared an authenticated plant of C. Müller's.

51. Rhaphidostegium leptorrhynchoides (Mont.) Jaeg.

Syn. *Stereodon leptorrhynchoides* (Mont.) Mitt. Musc. Ind. or., p. 103.

In Khundalas (ravines), Nilgiri Hills, leg. Fischer, c. fr. (n. 22). In accordance with Brotherus' arrangement I have placed this under Rhaphidostegium, although I think M. Cardot is probably correct in referring it, principally on account of the more or less distinctly papillose cells, to Trichosteleum.

36. **Sematophyllum** Mitt.

52. Sematophyllum monoicum (Lac.) Jaeg.

Unnasgiriya, Central Provinces., Ceylon, leg. Queste, st. (n. 30).

55 **Sematophyllum cucullifolium** Card. and Dixon, sp. nov. (Plate II, Fig. 6.)

Dioicum videtur. Caespites *densi*, straminei, nitidi. Caulis repens, densissime foliosus, *conferte ramosus*, ramis *perbrevibus* erectis, circa 5 cm. altis, foliis apicalibus convolutis subcuspidatis. Folia ramea *valde concava*, e basi parum angustata oblongo-ovata, *apice concavo-cucullato*, in cuspidem *subfragilem angustum canaliculatum acutum, plus minusve elongatum, subrecurvatum, abrupte angustata, integerrima*, folia caulina minus abrupte, longius acuminata; Cellulœ omnino lœves, basilares mediœ aurantiacœ, perangustœ, alares seriebus 4-5 hyalinœ, magnœ, oblongœ, subvesiculosœ. Perichœtia inconspicua, bracteis erecto-patentibus, late ovatis, *sensim anguste acuminatis, marginibus grosse dentatis*. Cetera ignota.

Hab. Shembaganur, Madura, 1911, leg., Queste (n. 20 e).

This appears to belong to the Section Chœtomitriella, and to be near *S. bunodiocarpum* (C. M.) which however has the leaves much longer pointed, almost piliferous.

I have found a fertilized perichœtium, but no male flowers.

Minute-leaved, dwarf plants frequently, indeed habitually occur epiphytically on the upper surface of the leaves, arising from a small tuft of protonemoid filaments, but I have no evidence at present that these are male plants.

54. **Sematophyllum pilotrichelloides** Card. and Dixon sp. nov. (Plate II, Fig. 5.)

S. extenso Card. (Beihefte zum Bot. Centralbl, Bd. XIX Abt. II, p. 134, 1905) Formosœ peraffine. Caulis secundarius *pendulus, semipedalis, gracilis, mollis, flexuosus, irregulariter remote subpinnatim ramosus*; rami breves, circa 1 cm. longi, nitidi, straminei.

Folia caulina erecta, sicca subappressa, concava, *oblongo-elliptica, in cuspidem breve acutum sœpe recurvum raptim attenuata*, -enervia; marginibus infra plus minusve reflexis, supra denticulatis; areolatio superior perangusta, cellulis ad infimam basin mediam aurantiacis alaribus trinis, magnis, hyalinis, parietibus *incrassatis, porosis*. Folia ramea magis patentia, paullo latiora, magis concava, *brevius cuspidata seu apiculata*. Reliqua desunt.

Hab. Unnasgiriya, Central Province, Ceylon, 1911, leg. Queste (n. 28). Also n. 27, a more slender, greener, less branched form.

This interesting plant has for its only near ally *S. extensum* Card. from Formosa, and forms an addition to the small number of identical or closely related species found in Ceylon and Formosa, without, so far as is at present known, appearing in intermediate regions. The Ceylon plant differs from the Formosan in the form of its leaves, much more abruptly and shortly pointed, and in the more incrassate alar cells.

37. **Rhegmatodon** Brid.

55. **Rhegmatodon polycarpus** (Griff.) Mitt. Musc. Ind. or., p. 127. Shembaganur, leg. Queste, c. fr. (n. 2). This species, known from several parts of the Himalayan range, has not, I believe, been recorded before from Southern India.

38. **Pleuropus** Griff.

56. **Pleuropus fenestratus** Griff.

Shembaganur, leg. Queste, c. fr. (n. 20 f.).

39. **Brachythecium** Schpr.

57. **Brachythecium procumbens** (Mitt.) Jaeg.

Syn. *Hypnum procumbens* Mitt. Musc. Ind. or., p. 79.

Shembaganur, leg. Queste, st. (n. 3). Near Galle, Ceylon, 1898, leg. Darrell (n. 150, 151).

40. **Oxyrrhynchium** Warnst.

58. **Oxyrrhynchium prœlongum** (Hedw.) Broth.

Poona; leg. Woodrow, circa 1895, ex herb. Kirtikar (n. 79=n. 40 Kirtikar; n. 8, Woodrow).

EXPLANATION OF PLATES.

Plate I.—Fig. 1. *Campylopus pseudo-gracilis*. *a*, plant, nat. size. *b*, leaf × 10. *c*, apex of do. × 50. *d*, leaf-base × 25. *e*, cells (at the point marked × in *d*) × 200.

Fig. 2. *Leucoloma Walkeri* (var. *stenocarpum*). *a*, leaf × 20. *b*, leaf base × 50. *c*, apex of leaf × 200.

Fig. 3. *Barbella Questei*. *a*, stem, nat. size. b, leaf × 20. *b*, do., flattened out, × 20. *c*, alar cells × 80.

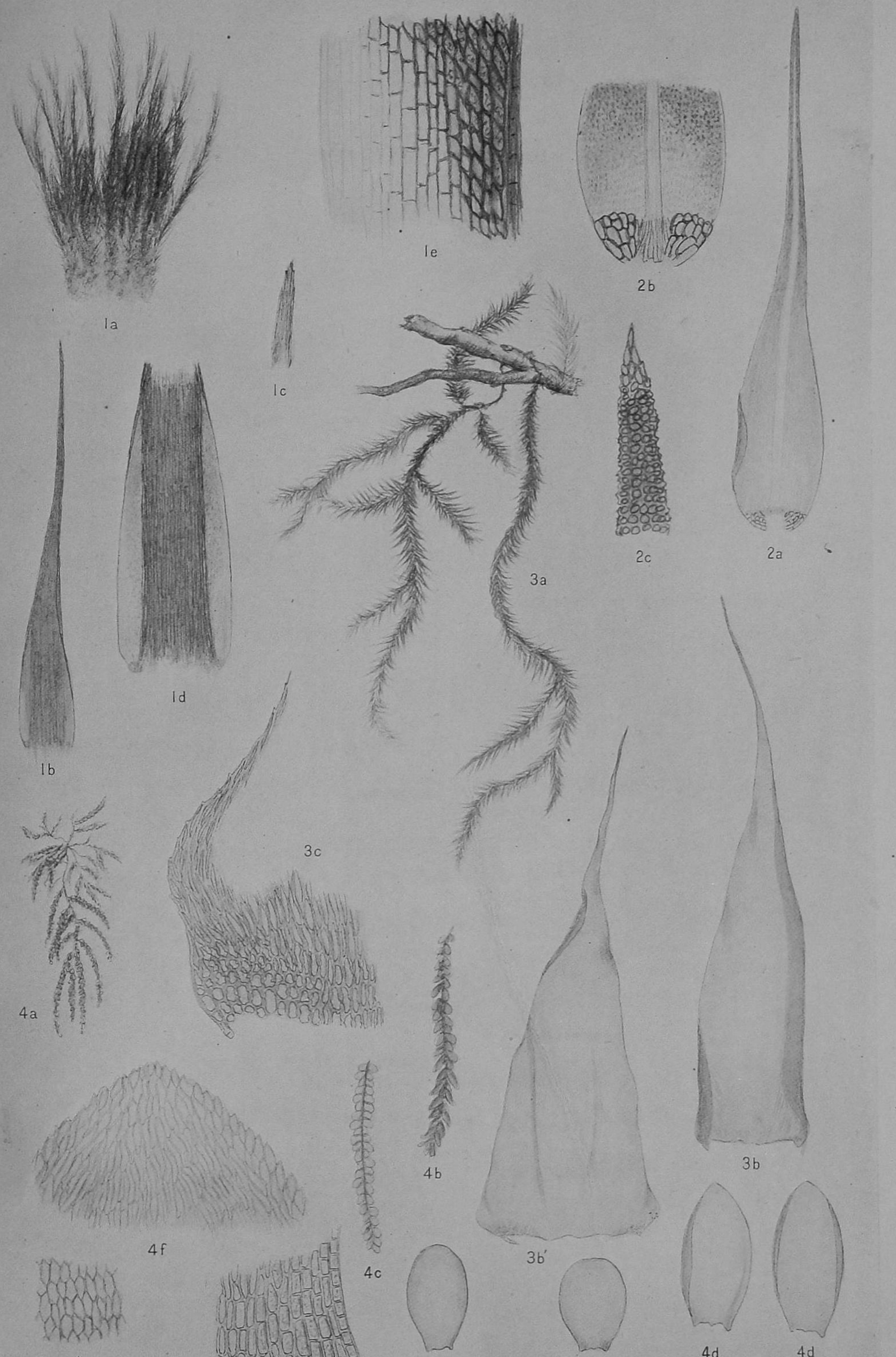
Fig. 4. *Taxithelium vivicolor*. *a*, stem, nat. size. *b,c*, branches (showing dimorphous leaves) × 4. *d*, leaves of *b* × 20. *e*, do. of *c* × 20. *f*, apex and upper cells of *d* × 200. *g*, upper cells of *e* × 200. *h*, alar cells × 200.

Plate II.—Fig. 5. *Sematophyllum pilotrichelloides*. *a*, stem, nat. size. *b*, branch (moistened) × 3. *c*, leaves of secondary stem × 20. *d*, branch leaves × 20. *e*, alar cells × 200.

Fig. 6. *S. cucullifolium*. *a*, stem, nat. size. *b*, branch leaves × 20 (showing dwarf plant). *c*, apex of do. × 40. *d*, alar cells × 200. *e*, apex of perichœtial bract × 40.

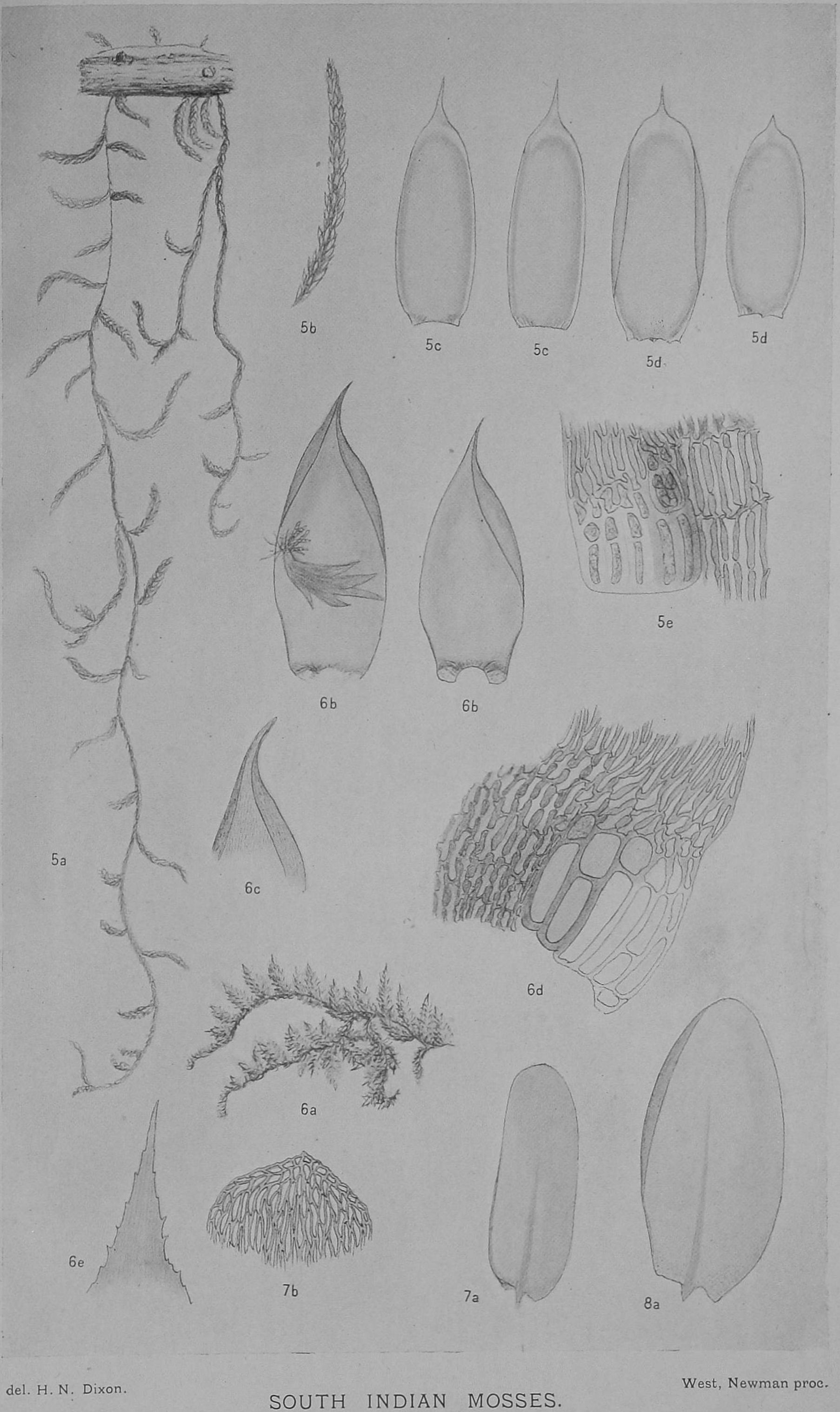
Fig. 7. *Stereophyllum ligulatum*. (orig. spec., Bombay, ex herb. C Müll.) *a*, leaf × 20. *b*, apex of do. × 50.

Fig. 8. *S. ligulatum* VAR. *Sedgwickii*. *a*, leaf × 20



del. H. N. Dixon. West, Newman proc.

SOUTH INDIAN MOSSES.



del. H. N. Dixon.

West, Newman proc.

SOUTH INDIAN MOSSES.

INDEX.

[**Species described are printed in heavier type.**]

PAGE.

A

Aerobryidium attenuatum (*Thw.* & *Mitt.*) *Fleisch.* 82
Aerobryopsis membranacea *Broth.* . 64
Aloma 78

B

Barbella Determesii *Ren.* & *Card.* . 82
„ enervis (*Thw.* & *Mitt.*) *Fleisch.* 64
„ javanica 83
Barbella Questei *Card.* & *Dixon* . 82
„ spiculata (*Mitt.*) . . . 83
„ subulifera *Fleisch.* . . . 83
Barbula comosa *Dz.* & *Mb.* . . 61
Brachymenium coarctatum . . 79
„ exile (*Dz.* & *Mb.*) *Bry. Jav.* 79
„ leptostomoides (*C. M.*) *Schimp.* . . . 79
Brachythecium procumbens (*Mitt.*) *Jaeg.* 89
Braunia indica (*Mont.*) *Par.* . . . 81
Bryosedgwickia Kirtikarii *Card.* & *Dixon* 83
Bryum argenteum *L.* var. . lanatum *B.* & *S.* . . . 80
„ „ var. australe *Rehm.* 80
Bryum leptosto moides C. M. Mitt. . 79
Bryum ramosum (*Hook.*) *Mitt.* . . 80
„ retusifolium *Card.* (ined.) var. heterophyllum *Card.* . . 80
„ sahyadrense *Card.* & *Dixon* . 79
Bryum strigosum Wils. . . . 80

C

Campylium glaucocarpon (*Reinw.*) *Broth.* 70
Campylopus gracilis (*Mitt.*) . . 76
laetus (*Mitt.*) *Jaeg.* . 77
Campylopus pseudo-gracilis *Card.* & *Dixon* 76
„ subfragilis *Ren.* & *Card.* . 76
Claopodium crispulum *Broth.* . . 69
Ctenidium lychnites (*Mitt.*) *Broth.* . 85
Cyathophorum Adiantum . . . 68
Cyathophorum Burkillii *Dixon* . 67
„ Hookerianum . . 68
„ parvifolium *Bry. Jav.* 68

D

Dicranoloma subreflexifolium *Par.* . 59
Dicranum fragile *Hook.* . . . 75
Dicranum laetum Mitt. . . . 77
„ *reflexifolium* Mitt. . . 59
Dicranum subreflexifolium *C. M.* . 59
Distichophyllum Griffithii *Par.* . . 66

E

Ectropothecium cyperoides (*Hook.*) *Jaeg.* 70, 71, 85, 86
Ectropothecium cyperoides *Hook Jaeg.* **Var. papillosum** *Card.* & *Dixon* . 71
Ectropothecium pseudo-cyperoides *Fleisch.* 71, 86
Endotrium aurantium . . . 81
Euglossophyllum ligulatum . . 84
Entodon plicatus *C. M.* . . . 83
Entosthodon physcomitrioides c. m. Mitt. 79
Erpodium mangiferæ *C. M.* . . 81
Erythrodontium julaceum (*Hook.*) *Par.* 83

F

Ficus pyriformis 72
Fissidens bryoides *Hedw.* . . . 78
„ diversifolius *Mitt.* . 60, 77, 78
„ nobilis *Griff.* . . . 61
„ pulchellus *Mitt.* . . . 61

PAGE.

Fissidens Walkeri *Broth.* . . 77, 78
Flacourtia cataphracta *Roxb.* . . 61
Floribundaria floribunda (*Dz. & Mb.*) *Fleisch.* 63
Funaria hygrometrica *Sibth.* . . 79
„ „ „ var. calcalvescens *B. & S.* . . 79
„ physcomitrioides *Mont.* . . 79

G

Gymnostomum pulchellum Griff. . 61
„ *repandum* Griff. . . 61

H

Hedwigia indica Mitt. . . . 81
Herpetineuron Toccoœ (Sull. and Lesq.) *Card.* var. excurrentinerve *Card. and Dixon* 85
Homalia exigua *Bry. jav.* . . . 65
Homaliodendron flabellatum (*Dicks.*) *Fleisch* 65
Hyophila subflaccida *Broth. and Dixon* 78
Hypnum herbaceum Mitt. . . . 73
„ *ligulatum* (C. M.) Mitt. . . 84
„ *procumbens* Mitt. . . 89
Hypopterygium flavo-limbatum *C. M.* . 68

I

Isopterygium taxirameum (*Mitt.*) *Jaeg.* . . 71, 72
„ taxirameoides *C. M.* . 72

L

Lejeunea serpyllifolia . . . 87
Leptostomum gracile 79
„ inclinans . . . 79
Leskea glaucina Mitt. . . . 85
„ **perstricta** *Dixon* . . . 68
„ *trachypoda* Mitt. . . . 69
Leucobryum Bowringii *Mitt.* . . 77
„ javense (*Brid.*) *Mitt.* . 60

PAGE.

Leucoloma amoene-virens *Mitt.* . . 75
„ erosum 76
„ Herzogii *Broth.* . . . 76
„ Walkeri *Broth.* . . . 76
„ „ „ var. **stenocarpum** *Card. and Dixon* . . . 75
Levierella fabroniacea var. **dilatatinerve** *Card. and Dixon* . . . 83

M

Macromitrium assamicum . . . 61
„ nepalense . . . 61
„ sulcatum *Brid.* . . 78
Macrothamnium macrocarpum (*Reinw. and Hornsch.*) *Fleisch.* . . . 70
Macrothamnium pseudo-striatum . 70
„ sub-macrocarpum (*Hampe*) *Fleisch.* 85
Meteoriopsis squarrosa (*Hook.*) *Fleisch.* 64
Meteorium attenuatum (Thw. and Mitt.) 82
„ *enerve* Thw. and Mitt. . 64
„ *membranaceum* Mitt. . . 64
„ trichophoroides (*Hampe*) *Mitt.* 64
Mniadelphus Griffithii Mitt. . . 66
Mnium integrum *Bry.-jav.* . . 62
„ rostratum 62
„ succulentum var. densum *Fleisch.* 62

N

Neckera acutata Mitt. . . . 64
„ *crinita* Griff. . . . 64
Neckeropsis acutata *Fleisch.* . . 64
„ crinita (*Griff.*) *Fleisch.* . 64

O

Octoblepharum albidum (*Linn.*) *Hedw.* 60
Oxyrrhynchium prœlongum (*Hedw.*) *Broth.* 89

P

Papillaria Bamforthiæ *Broth.* . . . 82
„ fuscescens 82
„ „ var. crassiramea *Ren. and Card.* 82

PAGE.

Papillaria sp. 82
Philonotis speciosa (*Griff.*) *Mitt.* . 63
Physcomitrium pulchellum *Mitt.* . 61
„ repandum *Mitt.* . . 61
Pleuropus fenestratus *Griff.* . . 89
Pogonatum aloides (*Hedw.*) *Beauv.* . 80
„ hexagonum *Mitt.* . . 80
„ Junghuhnianum (*Dz. & Mb.*) *Bry. Jav.* 81
„ microstomum (*R. Br.*) *Brid.* 80
„ Teysmannianum (*Dz. & Mb.*) *Bry. Jav.* 81
Pohlia elongata *Hedw.* . . . 79
Pottia vernicosa *Hampe* . . . 78
Pseudoleskea crispula Bry. Jav. . 69
Pterobryopsis aurantia (*C. M.*) *Fleisch.* 81
Pterobryum ceylanicum Thw. & Mitt. . 81

R

Rhacopilum Schmidii (*C. M.*) *Jaeg.* var. breviaristatum *Card.* . . . 85
Rhaphidostegium leptorrhynchoides (*Mont.*) *Jaeg.* 86, 87
Rhaphidostegium subhumile (*C. M.*) *Jaeg.* 87
Rhegmatodon polycarpus (*Griff.*) *Mitt.* 89
Rhizogonium spiniforme *Linn. Bruch.* . 62
Rhynchostegiella assamica *Card. & Dixon* 72
Rhynchostegium herbaceum (*Mitt.*) *Jaeg.* 73

S

Schlotheimia Grevilleana *Mitt.* . . 78
Sematophyllum bunodiocarpum (C. M.) 88
„ **cucullifolium** *Card. & Dixon* 88
Sematophyllum extensum *Card.* . . 88
„ monoicum *Lac. Jaeg.* . 88
„ *monostictum* Thw. and Mitt. 86
Sematophyllum pilotrichelloides *Card. & Dixon* 88
Semilimbidium 78
Stereodon cupressiformis . . . 71
„ *cyperoides* Mitt. . 70, 85
„ erraticus (*Mitt.*). . 65, 66
„ *glaucocarpus* Mitt. . . 70

PAGE

Stereodon juliformis Mitt. . . 83
„ *leptorrhynchoides* (Mont.) Mitt. 87
„ *lychnites* Mitt. . . . 85
„ pennatulus *Mitt.* . 65, 66
„ *plicatus* Mitt. . . . 83
„ scabrisetus 66
„ *subhumilis* (C. M.) Mitt. . 87
„ *succosus* Mitt. . . . 71
„ *taxirameus* Mitt. . . 71
Stereophyllum Blatteri *Card. ined.* . 84
„ ligulatum (*C. M.*) *Jaeg.* 84
„ „ var. **Sedgwickii** *Broth. & Dixon* . . . 84
Stereospermum 64
Symphyodon complanatus *Dixon* . 65
„ **scabrisetus** *Dixon* . 65

T

Taxithelium glossoides 87
„ lingulatum *Card.* . . 87
„ similans 87
„ **vivicolor** *Broth. & Dixon* 86
Terminalia myriocarpa 61
Thespesia populnea 84
Thuidium cymbifolium *Dz. & Mb.* . 69
„ glaucinum (*Mitt.*) *Jaeg.* . 85
„ trachypodum . . . 69
Trachypodopsis crispatula (*Hook.*) *Fleisch.* 64
Trematodon conformis *Mitt.* . . 59
Trichosteleum cylindricum (*Reinw. & Hornsch.*) *Broth.* 86
Trichosteleum monostictum (*Thw. & Mitt.*) *Broth.* 86
Trichosteleum monostictum (*Thw. & Mitt.*) *Broth.* var. **laevius** *Dixon* . 86

V

Vesicularia succosa (*Mitt.*) *Broth.* . 71
„ Montagnei (*Bél.*) *Broth.* .

CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
8, HASTINGS STREET.